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EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES AND NEWS.

The late Professor Cunningham.

It is hard to realise that the grave has closed over all that is mortal of Dan Cunningham. To his former teachers, his colleagues, his past and present pupils all over the world, never was an affectionate contraction so universally familiar. It is the simple truth that he had no enemy in the world. He had his own opinions and beliefs, and he held to them firmly, but he was so courteous, so generous in his consideration of the motives and of the views of those from whom he differed that his antagonists remained his friends. There appears elsewhere in the *Journal* an obituary notice by his life-long friend, George Gibson, but we think it right to say in this place that it was largely through Cunningham that the amalgamation of the two Medical Journals published in Edinburgh was so amicably and so harmoniously accomplished. His impartiality, his abnegation of self, and the charm of his personality overcame all difficulties arising from conflicting interests, and he thus added another to his many claims on our gratitude and affection.

Just before going to press and too late to procure notices, we learned of the death of Dr. P. A. Young, late Treasurer of the Royal College of Physicians, and of Dr. W. A. Finlay of Trinity, who was formerly Surgeon to Leith Hospital.

The Chair of Surgery.

Professor Chiene has resigned. Although his health is considerably improved he does not feel able for work, and he has felt it his duty to the University to resign his professorship. It is difficult to realise that it is twenty-seven years since, after a fierce contest (with Heron Watson, Joseph Bell and John Duncan), he was elected successor to James Spence. The many friends he has made among the thousands of students whom he has taught in these and the preceding years will wish him renewed strength to enjoy his retirement on the peaceful links of Barnton, where he has now made his home.

It would obviously be unfitting for us to discuss the probable candidates for the Chair, but two suggestions we think may safely be made to the Court, and the Curators to whom it falls to make the appointment. The first is so obvious that it is perhaps hardly necessary to mention it. The managers of the Royal Infirmary have established a rule that all its staff must retire at the age of sixty-five, and in the recent appointment to the Chair of Clinical Surgery that age was fixed for the retirement of the professor. The cases are not exactly on all-fours, but it is so essential that the Professor of Systematic Surgery should also be a clinical teacher, that we hope the age limit of sixty-five will apply to this professorship also, as indeed it should to all.

The second suggestion is that the appointment should be made *subject to such alterations in the duties of the Chair as the Court may at any future date see fit to make.*

Changes in the manner of teaching are inevitable, and however excellent his intentions, a professor who stands by the terms of his appointment and refuses to fall in with any change becomes a serious obstacle in the path of reform. We are all or nearly all of us reformers when we are young, it is well that we should not have too much power in opposing reforms when we grow old.

The Chair of Anatomy in Glasgow.

PROFESSOR CLELAND has joined the ranks of the Emeritus professors, and the Chair of Anatomy is vacant. The patronage lies with the Crown, and surely no Scottish Secretary ever had so many medical appointments to make as have fallen to the lot of Lord Pentland. It is only just to say that he has shown admirable discretion in the appointments he has had to make, and in this, as in the Aberdeen Surgical Chair which is still unfilled, he has excellent candidates from which to choose. Rumour says that among the likely ones are Principal Mackay of Dundee, a former assistant of Cleland's, Professor Paterson, of Liverpool, and Drs. T. H. Bryce and Buchanan.

The G. M. C.

A VERY undue proportion of the time of the Council was once more occupied with penal cases, and more than one matter of great importance had to be postponed. The report of the Education Committee was one of these, but like the Welsh Disestablishment Bill it has been promised the first place in the business of next session. It is the opinion of the Committee that it is still possible to give a sufficient education to the student in the five years now allotted to the curriculum, provided the time devoted to each subject is properly adjusted, and no one subject or group of subjects is given an undue preference. Some of the younger schools are easing the earlier part of the curriculum by substituting

for the separate courses of botany and zoology a combined one on biology. This allows the subjects of biology and physics to be got over in the first summer session, and the further path of the student is made much smoother. In our opinion it is a most desirable change, and might well be imitated by the older Universities.

Administration of Anæsthetics.

ANOTHER matter of great importance which also had to be postponed was the proposed legislation regarding anæsthetics. It was proposed—the Bill was then before Parliament, but has since been withdrawn—to make it illegal for anyone but a registered medical practitioner to administer anæsthetics. Clause 4 of the Bill imposed a penalty for giving a death certificate in the case of a person dying under an anæsthetic, while clause 5 prohibited a dentist, registered after the commencement of the Act, from giving an anæsthetic during a dental operation or procedure.

Clause 4 was intended to safeguard the public, by having an inquiry into all deaths occurring under a general anæsthetic. It was proposed to enact that every death which takes place during an operation in which an anæsthetic has been administered must be notified, and the coroner might, if he thought fit, hold an inquest.

On looking into the working of such a proposal, it is at once evident that it would not really be in the interest of the public. Everyone must be aware of the fact that in cases of emergency operations are often performed in order to give the patient a chance, small though it may be. A general anæsthetic is administered—the patient dies during the operation or when it is about completed. It is by no means certain that the anæsthetic is the cause of death, and yet, in such a case, an inquest might be held. We do not think that this would be in the interest of similar cases in the future.

The question of the dentists (clause 5 of the Bill) is an exceedingly difficult one. There is no doubt that by far the greatest number of deaths during dental operations or procedures have occurred under chloroform, and that dentists nowadays are not prepared to take the risk of inducing anæsthesia by a drug which has been proved to be dangerous. The death-rate under ether is very much less than under chloroform, under gas and ether still less, and least of all under nitrous oxide. There have only been 12 deaths in probably millions of administrations under nitrous oxide in the hands of dentists since 1878, somewhere about 8 of them occurring in the hands of registered dentists, 4 of whom held dental diplomas.

These figures make out a strong case for the dentist, and there is much to be said in favour of his contention that the interests of the public would suffer. It is absurd to expect all dentists to qualify as medical practitioners. They would require at least seven years' study, and the supply of qualified dentists would in the course of time

diminish. Or, again, if the presence of a medical man was insisted upon during a dental operation, a very large number of patients could not afford to pay the fees of medical man and of dentist, and dental practice would fall, to an even greater extent than at present, into the hands of unqualified practitioners.

In the meantime the Council appointed a committee, composed mainly of the surgeons on the Council, to consider the proposals for legislation on the subject of anæsthetics which had been or might hereafter be put forward, and to report to the Council on the position of the subject at the November session.

The late Ernest Besnier.

THE death of Ernest Besnier brings to a close a brilliant career, and by it, not only dermatology but medicine in general has lost a distinguished representative. Though he had reached an advanced age—he was born in 1831—and had retired from active practice, his was still a name to conjure with. Besnier had gained fame as a physician before he devoted himself to his specialty, and this, without doubt, conferred on him that intelligent perception which enabled him to grasp so successfully the connection between the more restricted and the wider field. The suggestive tone of his articles in French journals cause a feeling of regret that he did not himself write a complete treatise. He adopted a rarer course. Recognising the pre-eminence of Kaposi's work, in conjunction with Doyon, he set himself to translate it, and to their admirable version they added an invaluable commentary, composed in an independent spirit which imparts a unique value to the volumes; and the fact that a second edition, revised and much augmented, was called for, is incontrovertible proof of the estimation in which it was and is still held, for it is very far from being, even now, out of date. To appreciate Besnier alone and at his best, however, one ought to peruse his exhaustive article on eczema in *La Pratique Dermatologique*, which constitutes a mine of well-digested observation, the final result of years of close study of the immense mass of clinical material provided by the Hospital of St. Louis. To the outer world he exhibited a certain coldness and reserve which somewhat discouraged familiarity, but behind and beneath was a character essentially upright and correct. In the list of those who have elevated dermatology to its present high position the name of Ernest Besnier will ever occupy a prominent place.

Appointments.

DR. ASHLEY MACKINTOSH, Physician to the Aberdeen Royal Infirmary, to fill the vacancy caused by the resignation of Dr. Angus Fraser. Dr. Thomas Fraser, Assistant-Physician in Dr. Mackintosh's place. Dr. Edwin Matthew, Assistant-Physician to the Royal Infirmary, Edinburgh.

POST-MORTEM FINDINGS IN A CASE OF PSEUDO-HYPERTROPHIC PARALYSIS: ARTEFACT OF SPINAL CORD.

By BYROM BRAMWELL, M.D., F.R.C.P.,
Senior Ordinary Physician, Edinburgh Royal Infirmary.

In this communication I propose briefly to record the appearances found in the spinal cord of a typical case of pseudo-hypertrophic paralysis.

Clinical History.

G. R., aged twelve, was first admitted to the Edinburgh Royal Infirmary on 9th June 1894, suffering from pseudo-hypertrophic paralysis; he died on 22nd October 1901.

History.—His parents stated that he was a backward child; he did not walk until he was two and did not speak until he was five years of age. The disease seemed to have commenced at the age of eight; up to that time he was strong and active.

Family History.—The case was an isolated one, no other members of his family being affected; the father, mother and four other children, all younger than the patient, were, and have remained, healthy. There was no definite hereditary history, but a maternal aunt had weakness in the legs, the exact cause of which is uncertain.

Condition when first seen.—The attitude and gait were highly characteristic (see Figs. 1 and 2); the arching of the back, the throwing forward of the thorax, and the marked enlargement of some of the muscles, more particularly of the infraspinati, the triceps, the calf and gluteal muscles, was very striking. The gait was typically waddling. In rising from the floor the patient climbed up his thighs, but he could not completely raise himself to the erect position; he was unable to fix the shoulders to the thorax. The knee-jerks and Achillis-jerks were absent; the bladder and rectum were unaffected. There were no sensory derangements. The mental condition was quite normal.

I need not describe the clinical features and course of the case in detail; suffice it to say the disease slowly but steadily progressed; the patient was from time to time readmitted to the Infirmary.

The photograph reproduced in Fig. 3 shows his condition *on the 25th January* 1899. He was then unable to stand, walk, or

sit up in bed; he could not raise his head from the pillow; the tendo-Achillis on each side was contracted, and a condition of talipes equinus varus was present.

One of the most striking features of the case at this stage was the extraordinary difference between the size of the thorax and the abdomen; it is well brought out in the photograph. At the level of the nipples the thorax measured 28¼ inches; at the level of the umbilicus the abdomen measured 20½ inches. The head was relatively very large, the circumference being 21⅛ inches.

The muscles, which when the patient first came under my observation were markedly enlarged, gradually became atrophied; in the final stage of the case the muscles of the whole body, with the exception of the masseters and tongue muscles, presented an extreme degree of atrophy; up to the end the face looked full—the masseter muscles and the tongue appeared to be enlarged.

Portions of the muscles were removed during life and also examined post-mortem; the typical features of pseudo-hypertrophic paralysis were present (see Figs. 4 and 5).

The patient died on 22nd October 1901, the total duration of the disease being eleven years.

Post-mortem Examination.

This was hurriedly made three days after death at the patient's home under great difficulties, the weather being somewhat warm. I, unfortunately, myself could not be present at the examination.

The spinal cord was hardened in the ordinary way. The lower part of the cervical, the dorsal, the lumbar and the sacral regions were subsequently examined.

In the lower cervical and the dorsal region of the spinal cord remarkable alterations were found; the grey matter was split up and distributed through the cord in an extraordinary way, and the affected sections curiously malformed. The appearances are shown in Figs. 6 to 12. In one of the cervical sections a double central canal was present—situated on opposite sides of the cord, the two canals were separated by a large interval of grey matter.

Interpretation of the Alterations.—When I first examined the sections I was inclined to think that the appearances were due to a malformation of the spinal cord, but on subsequent examination and consideration I came to the conclusion that they were post-mortem lesions (artefacts).

In the year 1892 Dr. Ira van Gieson published an important

FIG. 1.—The case of pseudo-hypertrophic paralysis described in the text, showing the attitude in the erect position. The curvature of the back, the forward projection of the thorax, and the enlargement of the calves, buttocks and infraspinati muscles are well seen.

FIG. 2.—The case of pseudo-hypertrophic paralysis described in the text, showing the waddling gait. The great enlargement of the infraspinati muscles is well shown.

FIG. 3. The case of pseudo-hypertrophic paralysis described in the text, showing the [illegible] disease, extreme muscular atrophy, contractures, [illegible]

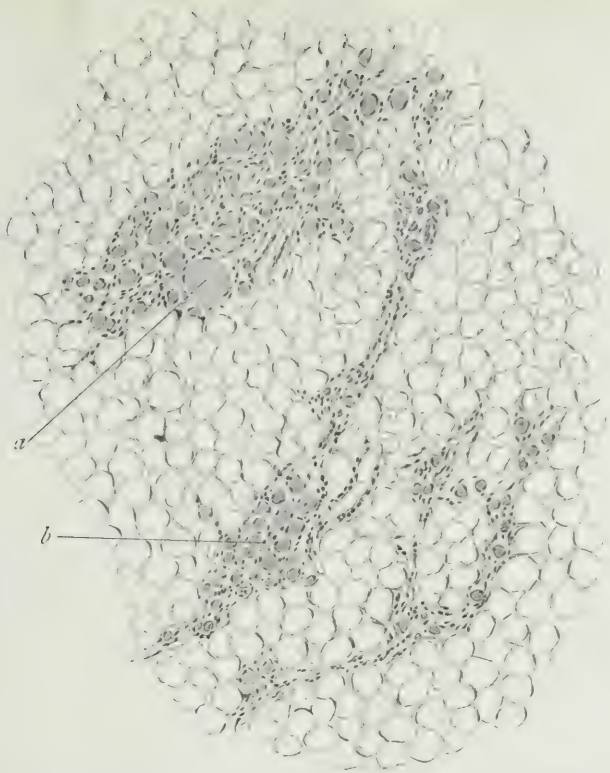


FIG. 4.—Camera lucida drawing of a microscopic section from a portion of the deltoid muscle removed during life in the case of pseudo-hypertrophic paralysis described in the text.

Large masses of fat cells are seen lying between the transversely divided muscular fibres. The letter *a* points to a greatly enlarged muscular fibre, the letter *b* to a group of transversely divided small muscular fibres.

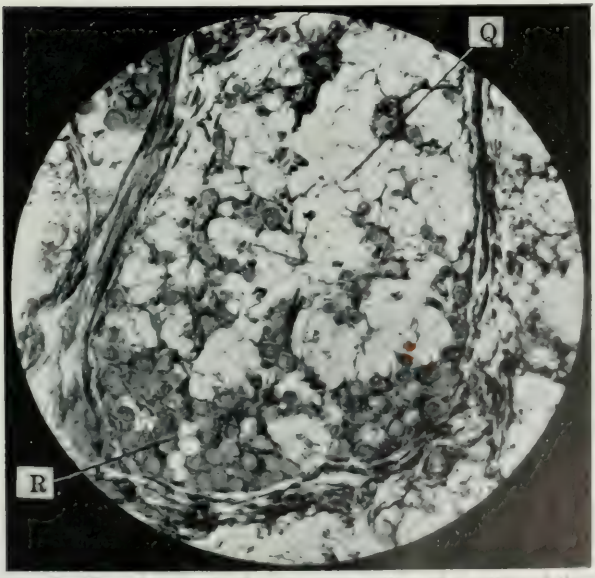
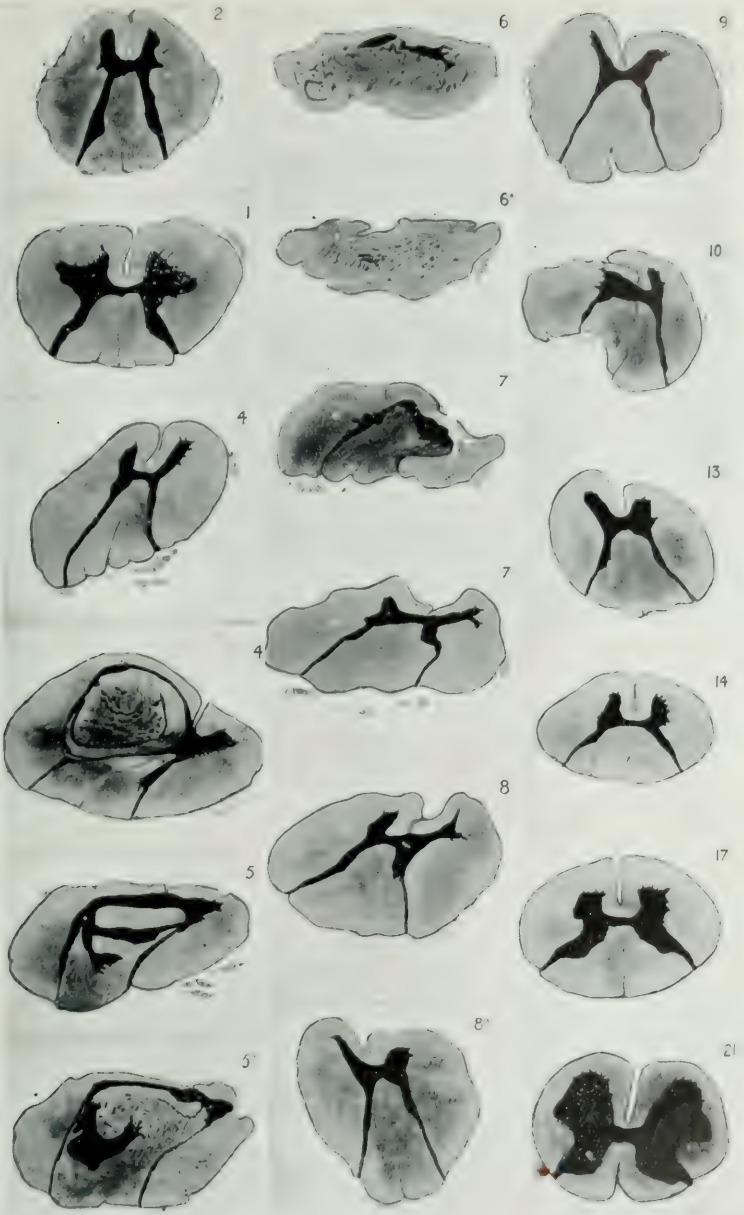


FIG. 5.—Micro-photograph of a transverse section of a portion of the deltoid muscle excised during life from the case of pseudo-hypertrophic paralysis described in the text.

Numerous darkly stained, transversely divided muscular fibres (to



Figs. 6. A series of sections through the lower cervical, dorsal and lumbar regions of the spinal cord in the case of pseudo-hypertrophic paralysis described in the text, stained by Weigert-Pal.

Figs. 4 and 4a, 5 and 5a, 6 and 6a, 7 and 7a, and 8 and 8a are sections through the upper and lower portions of the same block (segment).

The structure of the cord in Figs. 6 and 6a is completely disorganised; probably this was due to a severe bruise of the cord at the level of this segment. The segments immediately above the bruise (Figs. 5 and 4) and the segments immediately below the bruise (Figs. 7 and 8) are malformed, more particularly the segments above the lesion (bruise), the grey matter being forced upwards and downwards into the white matter.

The sections numbered 1, 2, 11, 15 and 21 are normal.

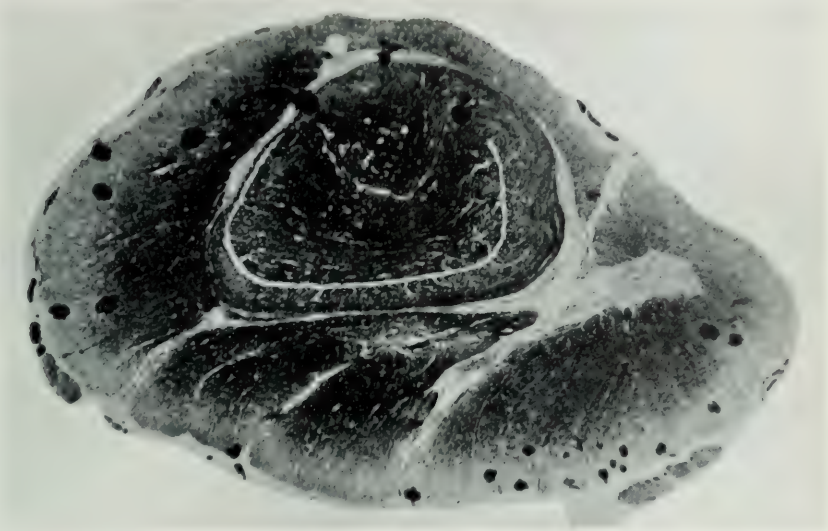


Fig. 7.—The segment represented in 4a, Fig. 6, more highly magnified.

In this section and in the sections represented in Figs. 8 and 9, the grey matter which is unstained is scattered about, in the midst of the darkly stained white matter, in the most curious way.

A fine horse-hair was passed through the left half of the spinal cord; the round hole seen in the sections reproduced in Figs. 7, 8, 9, 10, 11 and 12 represents the position of the horse-hair. It will be noted that in Fig. 9 the section has been reversed, the hole due to the horse-hair being on the right side of the section.

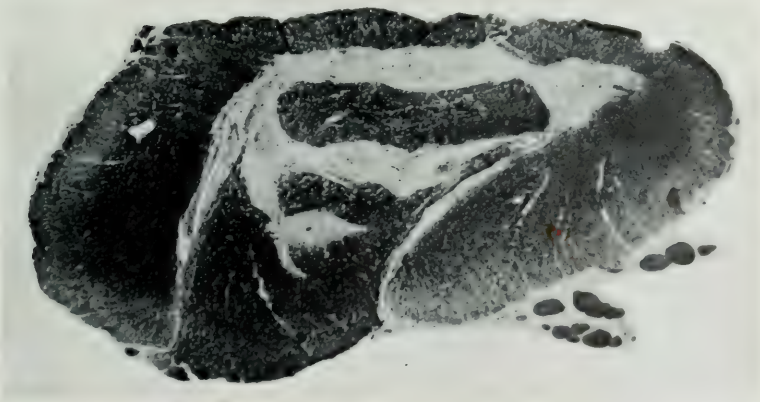


Fig. 8.—The segment represented in 5, Fig. 6, more highly magnified.

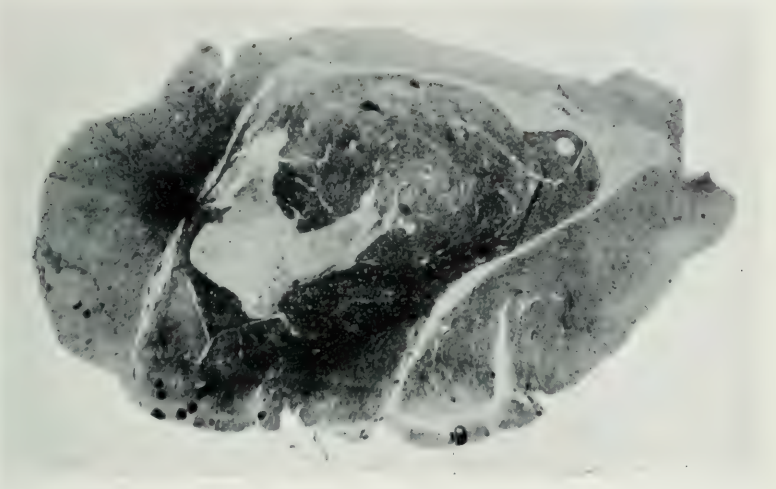


Fig. 9.—The segment represented in 5a, Fig. 6, more highly magnified.

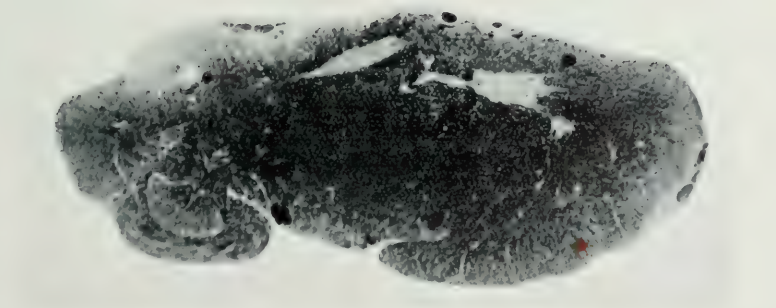


Fig. 10.—The segment represented in 6, Fig. 6, more highly magnified.
In this section, and still more in the section represented in Fig. 6a, the grey matter has been almost completely squeezed out of the section and the direction of the fibres of the white matter very much altered.

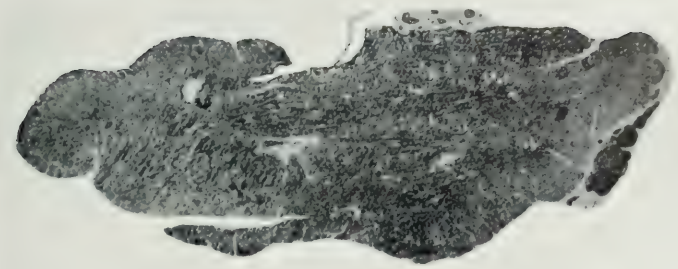


Fig. 11.—The segment represented in 6a, Fig. 6, more highly magnified.

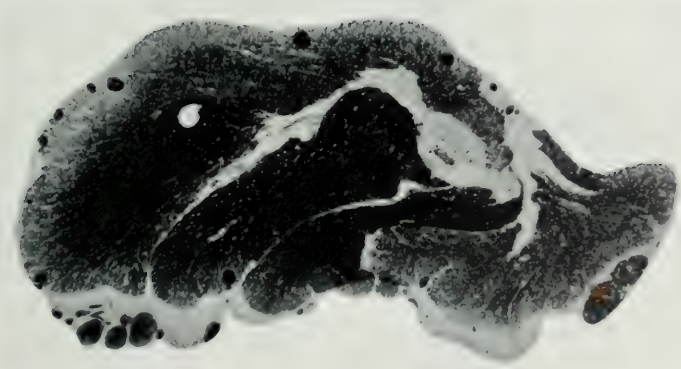


Fig. 12.—The segment represented in 7, Fig. 6, more highly magnified.

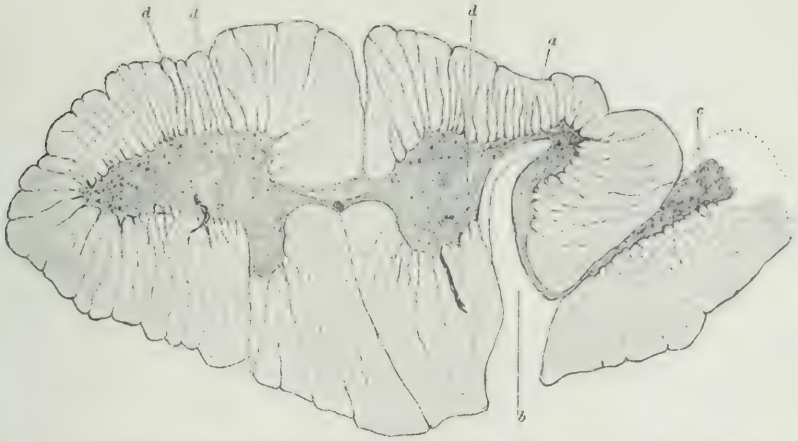


Fig. 13. Transverse section through the middle of the cervical enlargement in a case of pseudo-hypertrophic paralysis (magnified about 10 diameters).

The grey matter of the right lateral half is split up by a band of white matter (*a*) which passes into it from the posterior column, and by a deep fissure (*b*); *c*, detached portion of grey matter running out to the surface of the lateral column; *d*, *d*, *d*, fissures or tears in the grey matter.

Fig. 14.—Transverse section through the lumbar enlargement of the spinal cord in a case of pseudo-hypertrophic paralysis.

The posterior column is peculiarly shaped; part of the posterior horn of grey matter and a knob-shaped mass of the posterior column, to which the letter *a* points, are separated from the rest of the cord by an artificial fissure. The intermediate grey matter on both sides of the cord, to which the letters *c*, *c* point, is disintegrated. Two nerve cells are seen in the left posterior column, and several in the left lateral column, just outside the posterior horn of grey matter.

Note.—In the process of mounting this section has been reversed; the right half of the drawing is really the left half of the cord.

paper[1] on the "Artefacts of Nervous System," in which he showed that alterations in the shape and form of the spinal cord and of the relative positions of the grey and white matter, quite as remarkable as those which are present in the case which I am recording, may result from mechanical lesions (bruises, &c.) made in the spinal cord after death. In that paper he emphasises the importance of care in removing the spinal cord from the body, a point which cannot be too strongly insisted upon, more especially when the cord tissues are softened either by ante-mortem or post-mortem changes.

In the first edition of my book on the Spinal Cord, published in the year 1882, I described and figured the post-mortem findings in a case of pseudo-hypertrophic paralysis. In that case a curious alteration in the spinal cord, which I thought was a malformation, but which van Gieson thinks was an artefact, was present (see Fig. 13). In that, my first, case, fissures or localised softenings were present in the intermediate grey matter between the anterior and posterior horns.

In a second case of pseudo-hypertrophic paralysis, which was published and figured in the second edition of my book on the Spinal Cord, softening of the intermediate grey matter (which was perhaps an ante-mortem lesion), and a post-mortem lesion of the posterior column (artefact) were present (see Fig. 14).

From these statements it will be seen that in three cases of pseudo-hypertrophic paralysis which I have examined microscopically, alterations in the spinal cord, all of which were apparently artefacts, were present. If this is so, it is a remarkable coincidence, and shows how extremely careful one should be in drawing conclusions not only from one but from several cases. It is needless to say that I have examined microscopically a very large number of spinal cords; in four only out of all of the cases were there appearances suggestive of artefacts. The remarkable point is that three of these four cases were cases of pseudo-hypertrophic paralysis. I should add that in only one of the four cases did I myself remove the spinal cord from the body.

In the fourth case, which I have described and figured in the second edition of my book on the Spinal Cord, Plate LXIV. p. 74, a detached portion of grey matter was present in the cervical region between the two anterior horns of grey matter. The condition in that case was, I thought, due to a malformation; van Gieson thinks it was an artefact.

[1] *The New York Medical Journal*, 1892.

NOTES ON THE DIAGNOSIS AND TREATMENT OF PNEUMOCOCCAL AND DIPLO-BACILLARY HYPOPYON-KERATITIS.[1]

By ANGUS MacGILLIVRAY, C.M., M.D., F.R.S.E.,

Lecturer on Ophthalmology, St. Andrews University; Ophthalmic Surgeon, Dundee Royal Infirmary; Surgeon, Dundee Eye Institution; and Ophthalmic Surgeon, Dundee Institution for the Blind.

Ulceration of the cornea, especially when central or paracentral, should be regarded as a serious affection, for, if the substance of the cornea be involved, healing takes place by opaque cicatricial tissue, which will impair the vision of the eye in proportion to its density and in respect to its situation. But when the ulceration is attended by hypopyon there is not only danger to sight, but total destruction of the eyeball may occur, unless proper treatment be adopted.

The cornea, containing no blood-vessels of its own, and depending for its nutrition indirectly on the blood-vessels of the surrounding structures, cannot be regarded as a tissue of high resistance to any virulent micro-organismal invasion. Its prominent position at the front of the eyeball renders it liable to traumatic lesions, which may readily become septic, owing to the rich bacterial flora not infrequently met with in the conjunctiva and lachrymal sac. No doubt the cleansing action afforded by nictitation and lachrymation, together with the comparatively low temperature of the cornea, protects it, when injured, against bacterial colonisation to a large extent. It occasionally happens, however, that the virulence of the invading germs is more than the natural protective means can withstand, and an infective process becomes established. The future of such an infective process will to a very large extent depend on its bacteriology, so that the prognosis can only be determined by an accurate diagnosis of the etiological factor at the outset, and the application of proper, prompt and energetic treatment.

The most common cause of hypopyon-keratitis in man is the Fränkel-Weichselbaum *pneumococcus*. This organism is a frequent inhabitant of the lachrymal sac, especially when there is stenosis or complete blocking of the tear-duct. The pneumococcus has a special affinity for the cornea, for in dacryocystitis with mixed

[1] Paper read before the Forfarshire Medical Association on 2nd April 1909.

infection pneumococci alone are found in a corneal ulceration. But so long as the corneal epithelium remains intact the cornea may be bathed in lachrymal pus without suffering any injurious effect. Should the slightest abrasion of the epithelium occur, the pneumococcus can readily produce disastrous results. Next to the pneumococcus, the *diplo-bacillus* of Morax and Axenfeld is the most liable to cause hypopyon-keratitis. This bacillus, like the pneumococcus, is not a stranger to the ophthalmologist, for it is very frequently found to be the etiological factor in chronic conjunctivitis, especially that form known as *angular conjunctivitis*, characterised by excoriation of the skin of the eyelids at the inner and outer canthi. Morax and Axenfeld's diplo-bacillus is very frequently met with in this district, and is readily recognised under the microscope with the ordinary high power.

Other micro-organisms can produce hypopyon-keratitis, but as the pneumococcus and the diplo-bacillus are by far the most common and most important in this district, these notes will deal with the diagnosis and treatment of these two forms only.

Both forms are fraught with very grave danger to the eye, unless proper treatment be adopted without delay. Besides, it is of the utmost importance to be able to recognise the one form from the other, because the treatment differs essentially. Fortunately, the clinical appearances of each are characteristic and easily recognisable, so that a fairly accurate diagnosis can frequently be made from the clinical appearances alone; but when supplemented by a careful bacteriological examination the diagnosis becomes practically certain.

History.—In pneumococcal ulceration of the cornea there is frequently a history of epiphora or mucocele with tear-duct obstruction; and when we remember that the diplococcus lanceolatus is a frequent inhabitant of the lachrymal sac under pathological conditions, we readily see where the infection comes from as a rule. The least scratch of the cornea in such cases is liable to be followed by pneumococcal infection. This accident is commonly met with among workmen and adults, for children are nearly always immune to pneumococcal infection of the cornea. Curiously enough, although *pneumococcal conjunctivitis* is met with occasionally, it rarely produces corneal lesions, probably because this form of conjunctivitis runs a short course, tending to cure spontaneously by crisis, like the lung affection. The infection in pneumococcal ulceration, then, is not from the conjunctiva. Further, it is only rarely that the object causing the injury carries

the infection. Affections of the lachrymal duct and contamination with pneumococcal sputum are the most common infecting agents.

In diplo-bacillary ulceration there is evidence generally of chronic conjunctivitis due to the diplo-bacillus of Morax and Axenfeld. This form of conjunctivitis has no tendency, like the pneumococcal, to cure spontaneously, but tends to become chronic. A small corneal abrasion or phlyctenular infiltration in an eye affected with diplo-bacillary conjunctivitis would be liable to end in hypopyon-keratitis, especially when the abrasion is situated centrally, *i.e.* away from the source of nutrition. The infective agent, then, in this form of ulceration comes direct from the conjunctiva.

Clinical Appearances of the Ulcerative Process.—Pneumococcal hypopyon ulceration begins as a small superficial infiltration in the cornea, which soon breaks down, leaving a superficial loss of substance. One part of its circumference soon becomes densely infiltrated with overhanging margin, and this infiltrated portion tends steadily to progress superficially in a characteristically crescentic manner over the surface of the cornea, showing no marked tendency to perforate nor any tendency to spontaneous cure, as in pneumococcal affections elsewhere.

Pneumococcal ulceration of the cornea was first described in 1870 by Saemisch, and called by him ulcus corneae serpens. He was not aware, however, what the etiological factor concerned was, but in 1894 Uthoff and Axenfeld discovered that the ulcus corneae serpens of Saemisch was, in a very large proportion of cases, due to the *diplococcus lanceolatus, or pneumococcus.* This has been corroborated by all subsequent observers, so that ulcus corneae serpens and pneumococcal ulceration are now synonymous terms. Once pneumococcal ulceration sets in, the whole cornea may speedily become involved. To begin with, there is not much pain, and workmen affected may remain at work for a few days, when intense pain develops, which compels them to seek assistance.

The pneumococci are not found all over the surface of the ulcer, but only as a rule under the overhanging progressive margin amongst the infiltrating leucocytes. It is interesting to note in passing that pneumococcal corneal ulceration is rarely found during an attack of acute pneumonia due to infection from the patient's own sputum, although the germ affecting the lung is identical with that found in the cornea, as is proved by the fact that Römer succeeded by the action of pneumococci taken from an ulcus corneae serpens in making susceptible animals immune to

croupous pneumonia. This form of corneal ulceration is essentially a superficial serpiginous affection, with little or no tendency to cause perforation of the cornea. With regard to the participation of adjacent structures in pneumococcal ulceration, the conjunctiva becomes congested and frequently chemosed, and there is marked ciliary injection. The aqueous becomes turbid, and there is a variable amount of hypopyon with arched surface. The iris becomes inflamed, and there is often evidence of the whole of the anterior segment of the eyeball being involved in the inflammatory process. A very interesting feature in this form of ulceration is the ingrowing of epithelium over the floor of the ulcer from the side opposite the progressive margin, so that the healing process in typical ulcus serpens is at the heels, so to speak, of the necrotic process. Perforation of the cornea and prolapse of the iris may occur under certain circumstances, such as when the floor of the ulcer bulges forward, being unable to withstand the normal intra-ocular tension.

In diplo-bacillary ulceration with hypopyon the ulcer is localised, central and deep, with a tendency to perforation. It is usually more or less circular in outline, and uniformly infiltrated all round the margin, but with no tendency to spread superficially and in one direction. There is no overhanging margin, nor is the margin so densely infiltrated as in the pneumococcal form. The floor of the ulcer is irregularly infiltrated, and the rest of the cornea shows a loss of transparency, fading as we pass outwards from the ulcer. Near the margin one or two small secondary foci of infiltration are common. There is conjunctival and ciliary injection, and usually iritis, although not so marked as in the pneumococcal form. Hypopyon is present in varying amount, being generally level on the surface. At the outset there is considerable pain and lachrymation, but when the infiltration breaks down the pain usually disappears.

From what has been said regarding the clinical appearances of these two forms of ulceration one should be able to make a fairly accurate diagnosis except in the case of atypical forms. The final and most reliable test, however, is the bacteriological one, and fortunately this can, with a little care, be easily carried out.

Bacteriological Examination.—The cornea is anæsthetised by a few instillations of a 5 per cent. sterilised cocaine solution, the patient being enjoined to keep the eyelids closed after each instillation to prevent desiccation of the corneal epithelium. At the end of ten minutes or so the eyelids are held apart with

Desmarre's eyelid retractors, and the parts, especially the affected area, are carefully douched with tepid sterilised physiological salt solution. With a sterilised spatula a very tiny portion of the margin of the ulcer is removed, care being taken to get well under the overhanging edge if there be one. The portion removed is spread on a glass slide, fixed, stained with weak carbol-fuchsin, mounted, and examined preferably with an oil immersion. A fresh portion is taken, and with it a blood-serum or ascitic agar tube is inoculated and placed in an incubator at body temperature. If necessary a portion can be stained by Gram's method. Usually it is quite sufficient for the purpose in hand to use dilute carbol-fuchsin. Löffler's methylene blue may also be used, but in our experience weak carbol-fuchsin with a green screen gives perfect results. The pneumococcus in smear preparations presents the characters of the well-known and typical lanceolate and encapsuled diplococcus, and is Gram-positive. The diplo-bacillus often appearing in great numbers presents equally characteristic appearances microscopically. The bacilli are large and lie mostly in pairs, being on an average 2 to 3μ long and 1 to 1·5μ broad. They are rounded off at their ends, like a truncated oblong, and are generally of even thickness. The line of separation between the pairs is perfectly clear. They are Gram-negative, decolourising rapidly and completely. The diplo-bacillus grows well on blood-serum or on media containing human body fluids.

Treatment.—If the ulcer be pneumococcal the sooner recourse is had to surgical interference the better. Should there be dacryocystitis, ligature or cauterisation of the canaliculi, after flushing the sac freely with physiological salt solution should be done without delay, or, better still, removal of the lachrymal sac altogether. This ensures that the source of infection is cut off and fresh infection becomes impossible. The ulcer is then stained with fluorescine, and cauterised under cocaine. The fluorescine stains the affected part a deep emerald green, leaving the healthy parts unstained. The cauterisation may be done by a chemical escharotic, such as pure carbolic acid, or preferably by the galvano-cautery. Care should be taken to destroy all parts stained green, especially the overhanging progressive edge where the pneumococci are found. If this be thoroughly done, and the preliminary removal of any fresh source of infection be carried out, healing should go on without any further destruction of tissue. The after-treatment consists of instillations of 25 per cent. solution of argyrol solution every two hours and atropine drops ½ per cent. three

times a day, with or without hot fomentations, according to the severity of the case.

The healing process is slow and tedious, many weeks being required before healing is complete. A dense cicatrix naturally follows this form of ulceration owing to the radical treatment necessary to check the disease. Saemisch recommended dividing the floor of the ulcer by passing a Graefe's knife through healthy cornea on one side of the ulcer and passing it through the anterior chamber to be brought out at a point opposite in healthy cornea. This method, called Saemisch section, has in the past been practised largely and with success, but during the past fifteen years it has been to a very large extent replaced by the galvano-cautery. Anti-pneumococcic serum, introduced by Römer, has not given the results one would have expected. We have had no experience of this method of treatment, but, so far as we can gather, it cannot be relied on to give uniform results, even in the hands of Römer himself.

Should the condition turn out to be diplo-bacillary, cauterisation is not only unnecessary but is injurious. The diplo-bacillus succumbs readily to zinc preparations, such as sulphate of zinc solution, grains 2 to the ounce, instilled freely into the eye as often as every hour in bad cases. We apply it, to begin with, under pressure such as can be got with an Anel's lachrymal syringe or a hypodermic syringe. Atropine drops ½ per cent. are also instilled to break down adhesions and rest the eye, and hot fomentations in severe cases. If this simple method of treatment be carried out thoroughly it is most satisfactory. The diplo-bacilli disappear altogether in a few days from the eye and regression of the ulcer quickly sets in. The convalescence is protracted, as one frequently finds in virulent invasions of the cornea even after the virus has been removed. The resulting cicatrix clears up to a remarkable extent considering the depth of the lesions, thus contrasting much more favourably than is the case with the pneumococcal affection.

In short, the essential treatment of pneumococcal ulceration should be the free use of the cautery, and of diplo-bacillary ulceration, the free use of sulphate of zinc—such at least clinical experience would lead us to believe.

CANCER OF THE PENIS AND ITS EXTIRPATION.

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This is a disease of decline, though it has been noted in young men about thirty. Usually the type is squamous epithelioma, resembling more cancer of the lip than of the tongue, though an endothelioma of the sebaceous glands resembling a rodent ulcer or of the mucous membrane of the urethra may occur. Ulceration, except in the granulating varieties, does not occur early, though it is often the presence of an ulcer or fungating growth that first attracts the attention of the sufferer and makes him seek advice.

Diagnosis.—Syphilis alone can be confounded with the disease, and a short sharp course of iodides, with removal of a small part for microscopical examination, will clear up the diagnosis.

Alexis Thomson[1] mentions the following as precancerous conditions, viz.:—

1. A surface shedding of the epithelium and a vascularity of the deeper layers, with much leucocytotic infiltration and induration.

2. At first only a marked thickening of the epidermis or leucoplakia, either uniform or only over the papillæ, producing horny or filiform processes.

3. A condition resembling "psoriasis præputialis."

Eisendrath[2] places most diagnostic value on the induration, both about the original ulcer and in the glands, as distinguishing epithelioma from syphilis, but as the former disease is by no means a common one, the surgeon should not trust to clinical features alone, when the microscope and iodides will quickly decide for him. The general practitioner should refer all cases not materially benefited by treatment to the surgeon, unless there are distinct history and symptoms of syphilis.

The mode of spread is—(1) Early involvement by emboli of the nearest glands through the lymphatic vessels.

(2) Penetration locally into the neighbourhood. This is a comparatively slower process.

(3) Permeation along the lymphatic vessels. Here the infection must pass along the whole length of the penis till it reaches the trunk, and consequently the spread by permeation is not of

vital consequence. Infection of the lymphatic glands is much earlier than permeation of the lymphatic vessels would account for, and permeation into the scrotal tissues has not been observed till late in the disease.

Lymphatics of the Penis.—These may be divided into (1) Those of the skin proper; (2) those of the glands; (3) those of the urethra.

The last group may be described first, as they are not important channels of infection in early cancer of the mobile portion, but when the urethra is primarily affected, or when the primary disease is extensive, metastases may take place along them, especially after blockage of the usual collecting trunks. The collecting trunks of the urethra arise from the mucous membrane, and are continuous posteriorly with the trunks from the ejaculatory ducts, the vesiculæ seminales, and the vasa.

Those in front from the mucous membrane of the navicular fossa unite with those from the surface of the glans and terminate in the same lymphatic glands. Those from the remainder of the mobile urethra pass round the lateral surfaces of the corpora cavernosa to join the trunk from the glans. Sometimes a trunklet will run along the dorsum without uniting with the deep trunks from the glans, and, passing over the symphysis, get between the recti, to end in the internal retrocrural gland or in the middle gland of the internal iliac chain. Occasionally also a trunk passes under the symphysis and joins the collecting trunks from the bulbar portion of the urethra, but this occurs only from the proximal portion of the urethra.

The bulbar and membranous portions of the urethra have their collecting trunks disposed in three systems:—(1) One following the arteries of the bulb and the external pudic artery and ending in the intra-pelvic gland on the trunk of this artery. (2) Another running under the symphysis and behind the pubis and terminating in the external retrocrural gland. (3) A third trunk running upward on the anterior surface of the bladder to join a trunklet from this surface, and finally discharging into the middle gland of the internal iliac chain. None of these need be kept in mind in the removal of operable cancer of the mobile portion.

The important lymphatics are the following:—

1. The anterior cutaneous lymphatics which arrange themselves into four or five trunks in the region of the median raphé. These turn round the sides to reach the dorsum, along which they run backwards to the angle of the penis, where they turn outwards

immediately under the skin to the nearest inguinal glands, the supero-internal group. Those from the prepuce run backwards along the dorsum by the side of the superficial dorsal vein. At the reflexion of the prepuce they communicate with those of the glans proper.

2. The collecting trunks from the glans run first towards the frenum, where they join trunks from the anterior urethral mucous membrane, and then turn backwards along the coronal fold till they meet in the centre. They form trunks which accompany the deep dorsal vein. When they arrive at the symphysis they intercommunicate freely, passing through some glandular nodules here, and finally collecting into several trunks. Some of these trunks run outwards beneath the fascia of the thigh and above the pectineus muscle, to terminate in the deep inguinal glands, the gland of Cloquet, and the internal retrocrural gland, all of which lie along the inner side of the femoral and external iliac veins.

Other trunks from the presymphysial plexus pass up through the inguinal canal behind the cord, and terminate in the external retrocrural gland. There is usually a small glandular nodule on this trunk at the entrance of the inguinal canal.

It will be seen from the above description of the lymphatics that eradication of malignant disease in the penis is not so simple a matter as the exposed position of the organ would suggest. Early infection of the glands is the rule, and simple amputation may be of little ultimate benefit. As the intercommunication is free, removal of the lymphatic glands at one side, even where the disease is apparently one-sided, would also be futile. All the glands likely to be affected can be reached extra-peritoneally, and the tediousness of the dissection is the only bar to an attempt at complete eradication of the disease.

Operation.—The parts likely to be infected all lie along the dorsum of the penis and in either inguinal region, but when the bulb and the membranous urethra are affected, infection may already have reached the intra-pelvic glands, and removal of the whole penis is necessary. Even then the chance of a cure is small.

Butlin[3] suggests that the operation should be done in two stages. At the first operation the penis should be removed well behind the growth, and after this has healed the inguinal glands should be dissected out.

J. H. Nicol of Glasgow, in a recent issue of the *Annals of Surgery*, describes an operation for removal of the inguinal glands

which is extensive but not radical. He does not follow the trunk passing along the inguinal canal to the glands above Poupart's ligament as a routine method, though some of them, as we have seen, are primarily affected. He also begins his dissection below, which involves much handling of the diseased portion.

The first step in the operation should be the complete removal or covering up of the cancerous mass. The latter is easier in the penis and takes less time. After thorough washing with strong antiseptics and drying, or actual cauterisation, a piece of dry sterile gauze is wrapped round the penis, including the ulcer or fungating mass, and this is covered by sterilised G.P. tissue, which is firmly tied behind, so that no fluid can be squeezed backwards while the organ is being handled in the later stages. The rest of the field is then cleaned with depilatory. Skin incisions are made as follows:—First, from opposite the internal ring along the track of the cord, and bending slightly inward to reach the middle line at the angle of the penis; second, from the pubic spine outwards and downwards across Scarpa's triangle. The skin is reflected well back off the glandular area up to Poupart's ligament, and the inguinal gland mass is dissected upward from below. The long saphenous vein and its branches will be ligatured as they are met with and removed with the glands. There is little danger at this stage of wounding the big vessels of the leg which lie deeper, but care must be exercised as the saphenous opening is approached. A little below this point the deep fascia should be opened and the femoral vessels exposed and cleaned. The epigastric, circumflex, and other branches will have to be ligatured. The mass is freed above from Poupart's ligament, which is cut through obliquely and is reflected with the skin covering it. This opens the inguinal canal freely, and the gland of Cloquet and the retrocrural glands are easily removed, and any enlarged or hard glands above these are searched for by retracting the inner side of the inguinal canal and pushing the peritoneum upwards. The spermatic cord is ligatured above, cut, and removed from above downwards with the whole mass of glands, fat, and fascia behind it and around the vessels. The cord is ligatured again below and divided. All haemorrhage having been arrested, the cut ends of Poupart's ligament are neatly adjusted by silk sutures, and the skin sewn into place.

A similar dissection is done on the other side.

The skin-flap covering the symphysis above is next reflected upwards, and the subcutaneous fatty mass removed downward

close to the bone till the suspensory ligament is reached, where the dorsal vessels are cut and ligatured. The whole mass now lies attached to the penis below, and the mobile part has still to be dealt with. Two incisions, three-quarters of an inch or more apart, are carried along the sides of the dorsum, and the skin is reflected for half an inch more on either side. The dorsal vessels are removed with the loose subcutaneous tissue down to the tough fibrous covering of the corpora cavernosa. Amputation only remains. Hæmorrhage can be controlled by a temporary ligature at the root while the penis is being dealt with as follows:—The skin is divided circularly well behind the disease. The two corpora cavernosa are removed by a V incision, the angle of the V being at the pectiniform septum, and the spongy portion is left projecting for half an inch. The arteries in the corpora are picked up and ligatured. The two corpora cavernosa are turned towards each other and their fibrous tunicæ firmly sutured together. The corpus spongiosum is cut farther forward and fixed to the under surface of the united corpora. This gives the urethra an upward tilt which prevents dribbling. The urethra is split laterally and sutured to the skin, which is closed with a continuous celluloid thread. A dressing is applied to the groin wounds only, and the penis is dusted with boracic and iodoform powder.

Second. If the corpora and urethra are affected back beyond the scrotal angle, the prognosis is bad, as the intra-pelvic glands will also almost certainly be involved, and a radical operation is almost hopeless. But something approaching a radical operation may be attempted. The steps of such an operation would be exactly similar to those given above till the triangular ligament is reached, when the further cutting will involve division of the scrotum as suggested by Pearce Gould,[4] or, still better, the method described by Gray.[5] The urethral opening will then be behind the scrotum.

There is considerable shock after this prolonged operation, but by employing spinal anæsthesia and arresting bleeding as it arises, even old debilitated patients are not beyond the hope of cure, and the risk of the operation and the chance of eradication of the disease must be weighed against the usual amputation and removal of palpably enlarged glands. The testes need not be removed, though atrophy will follow the operation.

The prognosis after ordinary amputation in very early cases is fairly good, but in late cases where simple amputation is relied on, reappearance in the glands is the rule. This would probably be less often the case if surgeons always removed at least the first

set of lymphatic glands as described above. But in the newer surgical text-books removal of the lymphatics is not recommended as a routine, and a recent critic deprecated such radical measures, stating that, "It is difficult at present to determine whether the radical method can claim any advantage over simple amputation." Why such an opinion should be held by men who habitually clear out the axilla in mammary cancer it is difficult to conceive. Butlin[6] recommends routine removal of lymphatics, and gives the percentage of recovery without this as about thirty-five.

References.

[1] Thomson, *Brit. Med. Journ.*, 25th December 1897.
[2] Eisendrath, *Surgical Diagnosis*, p. 386.
[3] Butlin, *Operative Treatment of Malignant Diseases*, 2nd edition.
[4] Pearce Gould, *Lancet*, 1882, vol. i.
[5] Gray, *Trans. Med. and Phys. Soc.*, Bombay, 1887.
[6] Butlin, *Operative Treatment of Malignant Diseases*, 2nd edition.

A PHARMACOLOGICAL ESTIMATE OF THE VALUE OF COMMERCIAL SAMPLES OF THE LIQUID EXTRACT OF ERGOT, WITH NOTES ON ERGOT STANDARDISATION.[1]

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It is a deplorable fact that in the production of many of our most potent medicines the manufacturer is obliged to treat a statutory number of ounces of crude material with a statutory number of pints of fluid for a statutory period, under pain of a penalty for any recognisable deviation from this procedure. The potency or toxicity of the resulting product is a matter which need not concern him, and it is within my own experience that the toxicity of powerful medicines may vary from that of distilled water to six times the average. Thus a physician may order ten drops of the tincture of strophanthus, but his patient may actually receive the equivalent of one drachm. In the case of some drugs whose active principle is recognisable a chemical standard is laid down by the Pharmacopœia, but in cases where no chemical assay is possible it gives no guidance. It has been found, however, by many firms of manufacturing chemists, that it is in their interest to employ a pharmacological test for some of their products, and in the case of certain substances there are now ample data to afford standards. Well known examples are the tinctures of digitalis, strophanthus, and squills and preparations of adrenalin and cannabis indica. The position regarding ergot is different. Its therapeutic effects are notoriously uncertain, its chemistry is in a state of chaos. There is no general agreement regarding its pharmacological action, and there are no very satisfactory data to afford guidance in attempting to fix a pharmacological standard. Added to all this is the fact that ergot preparations tend to lose their activity very rapidly. Among the methods of standardisation employed are—(1) Blueing of the cock's comb. (2) The effect on the blood-pressure in pithed or in anæsthetised animals. (3) The reversal of the effects of adrenalin. (4) The effect upon the isolated uterus.

[1] Communicated to the Edin. Med. Chir. Society, June 1909.

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1. The first method consists in injecting fluid extract into fowls or feeding them with an ergot preparation. If the preparation be active the comb and wattles become blue and cold. The method is not a certain one. There is evidence that toxic effects and even gangrene may be caused without necessarily any effect on the contraction of the vessels or visceral muscle elsewhere.

2. The second method consists in injecting a fluid preparation intravenously and noting the effect on the blood-pressure of a pithed or anæsthetised animal. The standard set by different firms varies. One firm states that 0·66 c.c. of the liquid extract of ergot should raise the blood-pressure 60 mm. of mercury in an animal of 1500 grms. They do not state whether the animal is pithed, but presumably it must be. At all events, I have never found such a rise of pressure follow the intravenous injection of liquid extract prepared by the firm in question or any other. Another firm makes the more modest statement that 1 c.c. of a 1 in 3 solution of liquid extract of ergot should cause a rise of 20 to 30 mm. of mercury in a cat of 1½ to 2 kilos. weight. I have found this standard to be attained by the preparation of the firm in question and by others.

3. Dale has introduced a method which he has found to apply in particular to a base which he has isolated and called *ergotoxin*. Stated briefly, the method depends upon the fact that if adrenalin be injected into an animal during the rise of pressure caused by ergotoxin it will cause a fall of pressure.

Barger and Dale admit that the action of pharmacopœial extracts appears too great to be accounted for by the small amount of ergotoxin which they contain, and that it seems likely that some other active principle is present in them. I may add that I have not been able to obtain satisfactory results with preparations stated to be standardised by this method.

4. The effect of ergot in Ringer's solution on the isolated uterus has been employed as a means of standardisation and is claimed as an excellent method.

Methods in Present Research.

When the matter was first brought to my attention I considered that the effect upon the blood-pressure seemed to be the simplest and most accurate. Accordingly, observations were made upon rabbits and cats under full anæsthesia by ether. In most of the rabbits the vagus nerves were cut, a proceeding which keeps the mean blood-pressure much more constant. In cats there was

never any difficulty from pressure variations, and consequently the vagus nerves were cut in a few cases only.

In neither rabbits nor cats did section of the vagus have any effect on the action of ergot. The readings were taken from the carotid artery. The injections were made into the jugular vein. Adequate check observations were made and all negative or unsatisfactory results were tested by repeated experiments.

The investigation has been confined to samples of the liquid extract of ergot or proprietary preparations for oral administration comparable to it.

In Series I. and II. the dosage was varied so as to bring out the maximum rise of blood-pressure.

Series I.—Special Samples.

The first experiments were made with samples submitted to me by manufacturing chemists to be tested physiologically. It is therefore probable that these samples were made from ergot carefully selected. In every case there was a fall of blood-pressure succeeded by either a return to normal or a rise above it. The results given by the last seventeen specimens are as follows:—

	Millimetres of Mercury.	
	Fall.	Rise.
I.	40	0
II.	20	34
III.	40	28
IV.	40	0
V.	50	50
VI.	13	0
VII.	34	18
VIII.	16	32
IX.	70	50
X.	24	22
XI.	34	20
XII.	20	30
XIII.	13	29
XIV.	86	8
XV.	12	0
XVI.	110	20
XVII.	48	0
Average	39·4	20·5

This table shows that every specimen caused a fall of blood-pressure. As regards pressor action,

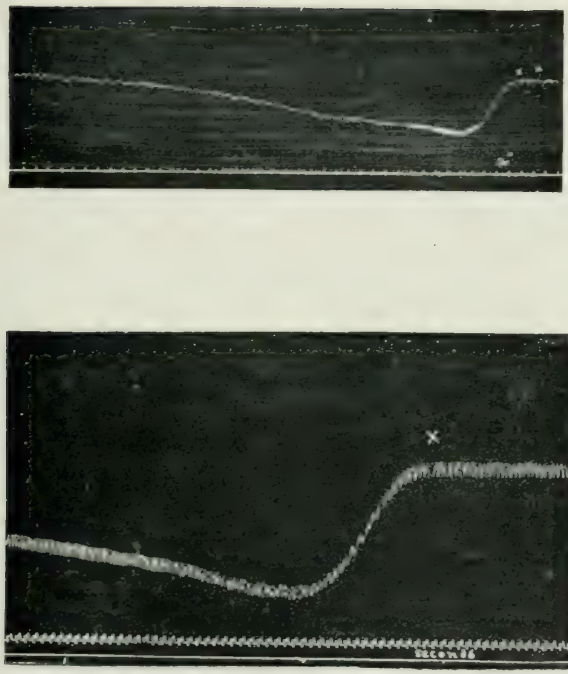

Fig. 1. Two typical blood-pressure tracings after intravenous injection of Hyoscine-strength of digest. The upper one [illegible] a satisfactory rise, the lower one not. (All the tracings were [illegible].

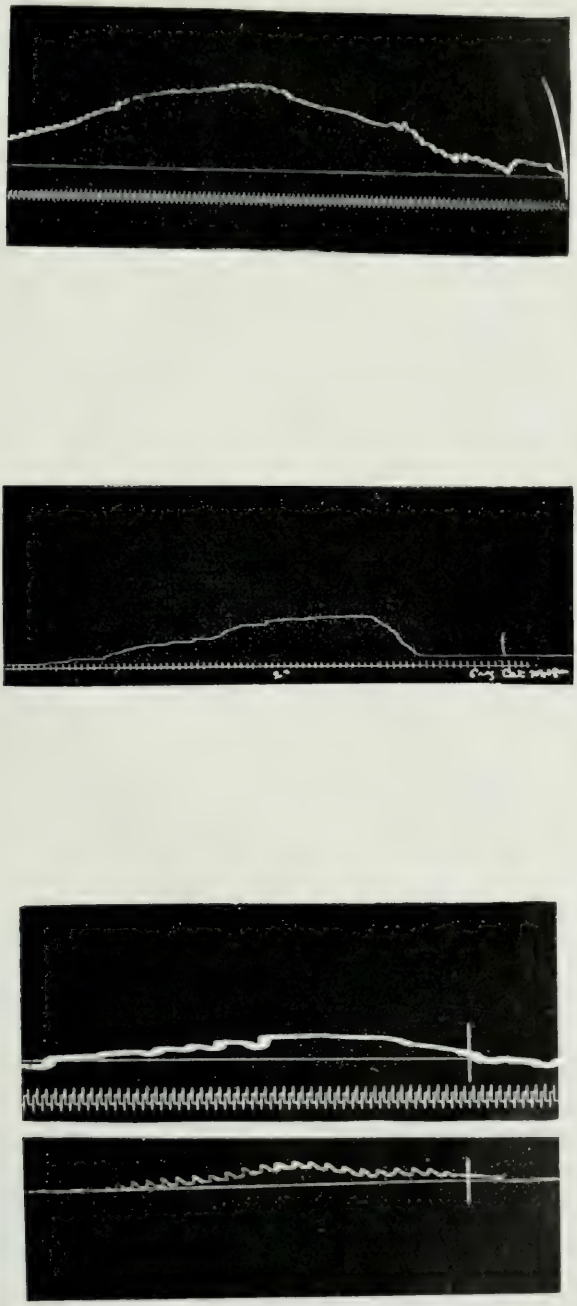

Fig. 2. Two satisfactory and two premature contractions after intravenous injection of ergot.

5 specimens had no effect.

1 specimen caused a rise of less than 10 mm. of mercury.

1 specimen caused a rise of from 10 to 19 mm. of mercury.

5 specimens caused a rise of from 20 to 29 mm. of mercury.

5 specimens caused a rise of 30 or more mm. of mercury.

In other words, 70 per cent. failed to cause a rise of 30 mm. and 41 per cent. failed to cause a rise of 20 mm. of mercury.

Series II.—Ordinary Commercial Samples.

I now requested a dispensing chemist in Edinburgh to furnish me with samples of the liquid extract of ergot. My instructions were to obtain samples from all or nearly all the manufacturers in Edinburgh and from chemists elsewhere, either of good repute or who advertised extensively.

The samples were obtained directly from the source and investigated within a fortnight of receipt.

	Millimetres of Mercury. Fall.	Rise.
Edinburgh Firms.		
I.[1]	70	50
II.[1]	20	30
III.	36	4
IV.	48	12
V.	90	30
VI.	90	0
VII.	94	20
London Firms.		
VIII.[1]	48	10
IX.[1]	36	0
X.	109	19
XI.[1]	40	20
XII.	60	10
XIII.[1]	20	0
XIV.	34	16
Other Firms.		
XV.[1]	56	8
XVI.	80	0
XVII.	76	6
XVIII.	70	0
XIX.	50	6
XX.[1]	14	0
XXI.[1]	60	0

[1] Alleged to be physiologically standardised.

These figures speak for themselves, but it is interesting to note that 3 of the 7 Edinburgh samples failed to cause a rise of 20 mm., 6 of the London samples failed, as did all the others.

Taken together, we find that 76 per cent. of the commercial samples failed to raise the blood-pressure 20 mm. of mercury.

Series III.

I now determined to combine observations on the blood-pressure with observations on the uterus. Various methods were employed, but I came to the conclusion that for the end in view broad effects were more desirable than nicety of detail, and therefore I latterly adopted the following procedure:—After adjusting the blood-pressure apparatus and venous cannula, a small opening was made in the abdomen just below the level of the extremities of the cornua. A hook was passed round both cornua and was attached by means of a cord to a horizontal muscle lever to which a weight of 30 grms. was attached. By this means the uterine cornua were slightly stretched in the form of a loop between their attachments at the vagina and tubes. The abdominal wound was clipped together so as just to leave free play for the uterus, and the whole abdomen was then lightly covered with a pad of wool wrung out of Ringer's solution at body temperature surmounted by a piece of gutta-percha tissue. The blood-pressure tracing and uterine contractions were recorded simultaneously on a large kymograph.

In this series the dose was varied so as to bring out the maximum effect on the uterus. The corresponding blood-pressure effect was noted.

Edinburgh Firms.

	Fall.	Rise.	Uterine Contraction. Pregnant.	Non-Pregnant.
I.[1] . .	48	0	S. +	...
	70	50	...	S. +
II.[1] . .	20	30	...	S. +
	75	29	S. +	...
III. . .	36	4	...	S.
IV. . .	48	12	...	S. –
V. . .	26	6	...	S. +
VI. . .	90	0	...	O.
VII. . .	94	20	...	S. +

[1] Alleged to be physiologically standardised.

London Firms.

	Fall.	Rise.	Uterine Contraction. Pregnant.	Non-Pregnant.
VIII.[1] . .	48	10	...	S. –
IX. . .	70	0	...	S. –
X. . .	109	19	...	S. +
	84	10	S. +	...
XI.[1] . .	38	8	...	O.
	60	0	S.	...
XII. . .	94	0	...	S.
XIII.[1] . .	20	0	...	S. +
XIV. . .	60	0	...	S. +

Other Firms.

XV.[1] . .	16	0	O.	...
	66	0	...	O.
XVI. . .	55	0	O.	...
XVII. . .	30	10	...	S. +
	74	6	S. +	...
XVIII. . .	70	0	S. +	...
XIX. . .	84	0	...	S. +
XX.[1] . .	56	0	S. –	...
XXI.[1] . .	60	0	S. +	...

These tables show that 14 of the 21 samples caused a satisfactory contraction of the uterus in doses which did not necessarily raise the blood-pressure, while 4 samples caused a slight contraction, and only 3 failed to affect the uterus. That is to say that 66 per cent. of the samples caused a well-marked uterine contraction, and 85 per cent. caused a contraction of some sort.

In reviewing the results of the three series, the most striking is the absolutely constant fall of blood-pressure which follows immediately upon an intravenous injection. It is stated by Dixon that this fall is due to impurities, and that it does not occur if the ergot be injected subcutaneously. The question of the absorption of ergot does not come within our purview, but there can be no doubt that the pharmacology of ergot will remain unsatisfactory until a means of separating the depressor constituents has been discovered.

The rise of pressure which follows the fall is not nearly so constant, but it may be that in many experiments the depressor and pressor substances balance each other. When a given sample does cause a rise of pressure, the rule is that it is considerable and well sustained. It would appear that a sample of ergot which

[1] Alleged to be physiologically standardised.

causes a rise of blood-pressure will also cause contraction of the uterus, but a sample which causes no rise of pressure may yet cause a satisfactory uterine contraction.

Samples of ergot may cause contraction of the uterus in smaller doses than are required to raise the blood-pressure. Ergot therefore appears to have a specific action on the uterus, and, so far as my experiments go, the action does not greatly differ in regard to the presence or absence of pregnancy.

Conclusions.—The object of this paper is not an attempt to explain the pharmacology of ergot. It is, firstly, a record of the pharmacological action of liquid extract of ergot as obtainable in the market, and, secondly, it embodies suggestions for making the therapeutic effect of ergot more reliable. From this standpoint the following conclusions may be formulated:—

1. Whereas 41 per cent. of selected samples, and 76 per cent. of commercial samples of liquid extract of ergot failed to cause a satisfactory rise of blood-pressure, and whereas 34 per cent. of commercial samples failed to cause a satisfactory contraction of the uterus, ergot prescribed for therapeutic use should be tested pharmacologically.

2. The effect on the blood-pressure is a satisfactory method of testing as far as the prescriber is concerned. A fair standard is, that a dose not greater than 20 minims injected intravenously should cause a rise of blood-pressure of 20 mm. of mercury in an anæsthetised animal of 1500 grms.

3. Whereas 42 per cent. of commercial samples caused contraction of the uterus without effecting a rise of blood-pressure, the action on the uterus might be regarded as a more satisfactory test by the manufacturer, and in view of the almost exclusive use of ergot in uterine conditions, might be considered sufficient by the prescriber.

4. In the present stage of knowledge it is hardly possible to adjust the therapeutic dosage of ergot to pharmacological findings. The prescriber should have some guarantee that his ergot is active, and should administer it only in doses which his experience has taught him to be sufficient and safe.

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A YEAR'S WORK WITH THE X-RAYS IN DIAGNOSIS IN THE DUNDEE ROYAL INFIRMARY.[1]

By GEO. A. PIRIE, M.A., M.D.,
Medical Electrician to Royal Victoria Hospital, Honorary Medical Electrician to Dundee Royal Infirmary.

On 15th February 1908 the department for examining patients by means of the X-rays was reorganised. A new and larger room was provided; more recent apparatus was supplied; and the whole system placed on a new footing. During the year following, 1260 cases have been examined, and in the majority of these a permanent record has been kept, by means of negatives which number now over 2000.

A brief analysis of these cases may be permitted.

There were 461 cases of serious accident, namely, 400 fractures and 61 cases of foreign bodies being swallowed or inserted under the skin. There were 236 cases of disease (chiefly of bone), 28 cases of abnormalities of development, and the remaining 535 were cases of minor injury.

Before considering these in detail, let me give a description of how a case is examined. The name, age and address are entered in a book, also the nature of the injury, and when and how it happened. Then the patient lies on the X-ray couch, and the affected part is examined by the fluorescent screen laid above it, while the lamp is excited below. If the shadows of the bones and other structures appear normal, no further action is taken. A report is sent to the surgeon in charge, and a note is put in the book that on screen examination nothing abnormal was visible.

If, however, there is any doubt about the appearances on the screen, a photographic plate, wrapped in red and black papers, is slipped under the screen and kept steady for 10 seconds to 3 minutes, as may be required. That plate is developed the same day in the dark room adjoining, and the negative is on view the following day. It is marked by the running number and name of the patient, and is afterwards stored in a strong envelope for preservation. At the same time a note as to the appearances seen on the negative are entered in the book, and a copy sent to the surgeon in charge.

In the early days of the work every negative was sent to be

[1] Read before the Forfarshire Medical Association, April 1909.

printed, and the print was handed to the surgeon. This privilege was soon restricted, and latterly withdrawn altogether.

Synopsis of 1260 Cases Examined by X-Rays during Year Ending 15th February 1909.

10	Fractures of clavicle		
65	,, humerus		
104	,, radius and ulna, (Colles 28)		241
5	,, carpals		
38	,, metacarpals		
19	,, phalanges		
3	Fractures of os innominatum		
29	,, femur		
3	,, patella		
90	,, tibia and fibula, (Pott 28)		153
12	,, tarsals		
14	,, metatarsals		
2	,, phalanges		
6	Dislocations	6	
			400
61	Foreign bodies swallowed (18) or inserted (43)		
106	Disease of bone		
42	Examinations with bismuth swallowed (12) or injected (30)		325
31	Chest cases (aneurism, 17)		
57	Kidney cases		
28	Abnormalities of development		
	Minor injuries		535
			1260

Consider now the series of 400 fractures. They include 241 of the upper extremity, and 153 of the lower extremity, and there were also 6 cases of dislocation.

These fractures were of all degrees of severity—from fracture of both femora with displacement, to a slight crack in the radius, visible only on the negative, and then after a very careful search.

And here let me enter a protest against the use of the screen *alone* in many of these cases. A simple fissure in a bone without any displacement cannot be detected on the screen, however powerful the lamp may be; and sometimes, even if there is displacement it can only be observed with the limb in one position. If, however, a plate be exposed and developed, the slightest inequality in the structure of the bone can be detected, and of

course any displacement can be seen at once. I would therefore urge that in every case suggestive of fracture at least one plate be taken, or still better two, in planes at right angles to each other; then no crack or displacement can go undetected.

The custom is growing of having a plate taken of a fractured limb soon after admission, and again a week later to see if the fragments are in good position; and perhaps again before the patient leaves hospital, to see how much callus has been formed. In the interest of the patient this is an admirable plan and deserves to be adopted for all cases. Of course, if screen examination on the second and third occasions shows the bones to be in good position, no plates need be taken, and that would reduce the expense.

Occasionally the first examination of a fracture has been delayed till the splints are about to be removed, from 6 to 9 weeks after the accident; and it sometimes happens that the screen shows displacement or even overlapping of the fragments with consequent non-union. Such a result must be very disappointing to the surgeon, and might easily be avoided by arranging for the first examination within a week of the accident.

Sixty-one patients came with the story that something had gone down their throat by mistake, or through their skin, or into their eyes.

These foreign bodies were most varied in nature. Those swallowed included a tooth plate, pennies, halfpennies, a threepenny bit, pins, whistles, a buttonhook and so on. Sometimes the article was seen arrested in the œsophagus just above the sternum; more frequently in the stomach or small intestine. If ten hours had elapsed, it was invariably to be seen in the colon and finally in the rectum. In one case a penny remained for over a week in the rectum. As the screen still showed it there, an enema was ordered, and the shadow was seen no more.

The foreign bodies which effected an entrance, otherwise than by the mouth, included needles and pins, bullets and pieces of steel. In one case 103 pellets were lodged in the elbow without damaging the bones (see plate A).

Foreign bodies in the eye are of special interest. They require peculiar fixing apparatus and careful adjustment, and in many cases a plate must be taken as they are not easily seen on the screen. Eleven cases have been examined; and the objects included a bullet, a piece of stone, and frequently pieces of steel.

In some of these cases stereoscopic views were obtained by

moving the lamp about 2½ inches, but the result was not sufficient to localise the foreign body exactly. With more suitable localising apparatus it would be possible to calculate the exact situation, and thus give an indication to the surgeon as to the best incision to make for the removal of the object.

Cases of disease—apart from recent accident—numbered 236.

Of these the majority (106) were cases of diseased joints and bones. They presented all varieties of appearance on the screen—from the slight irregularity and thickening of periostitis (see plate C), the loss of osseous material in caries, and the general atrophy with pencilled outline seen in septic diseases of hands or feet, to the complete disorganisation seen in osteomyelitis, and new growths.

Rheumatic joints as a rule show little change; osteoarthritis with its long outgrowths, and gout with its calcareous nodules are easily recognised. Tuberculous joints unfortunately do not shew much change, except for a general dimness and indistinctness of outline as compared with the sound limb.

Abscesses can sometimes be detected on the screen; but sinuses are invisible, until distended by bismuth and vaseline to show the course and extent of the sinus. This mode of examination is of recent date, but 30 cases were so treated, and in most of them the whole length of the sinus and its branches were clearly shown (see plate D). Besides, this bismuth injection has proved serviceable for treatment, as the discharge from the sinus gradually diminished and the abscess cavity eventually closed.

I believe that every sinus that has resisted simple measures should have this method of examination applied to it. It is painless; it gives very important information as to the extent of the lesion; and it may be the means of closing the sinus, or at least guiding the surgeon in his efforts to remove the sequestrum or other cause which keeps it open.

Bismuth is also used in the examination of the alimentary tract. Ten cases of œsophageal stricture have been examined while a bismuth meal was given. The bismuth was seen passing down the posterior mediastinum and stopping at the seat of stricture.

Another class of case treated by bismuth for examination purposes is *chronic constipation*. Two oz. of the bismuth carbonate are given with breakfast, and the patient is examined every 4 hours or more until the bismuth shadow reaches the cæcum, passes up the ascending colon, across—or rather down the transverse colon (for it is usually prolapsed in these cases), then up

PLATE A. PELLETS ROUND ELBOW.

A. P., age 10. Shot accidentally on 19th November 1908. Beaconsfield. 107 pellets present.

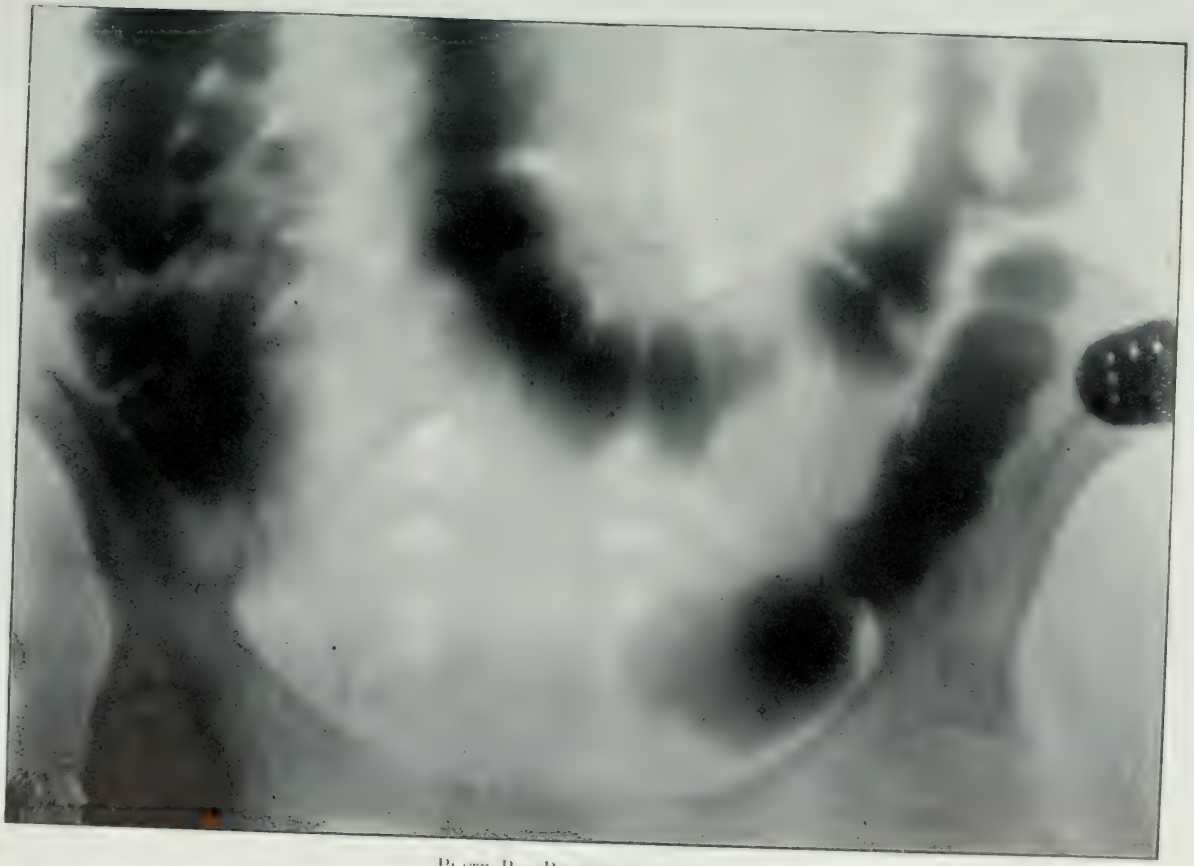


PLATE B.—BISMUTH IN COLON.

Mrs. L., age 45. Chronic constipation for years. Two oz. bis. carb. given with breakfast, 7 A.M. 11th May [illegible]
March, 51 hours later.

PLATE C. NECROSIS AND PERIOSTITIS OF HUMERUS.

Annie D., age 8. Felt pain in right shoulder, December 1908. Photo taken one month later. Necrosis of all the shaft of humerus, with new bone formation.

PLATE D.—SINUS IN LEFT THIGH WITH BISMUTH INJECTION.

W. D., age 33. Had pain in thigh for seventeen years. Supposed rheumatism; abscess formed, was lanced; has suppurated ever since. Plate shows circular sinus with small piece of detached bone at lower end. Operation by Mr. Greig. Sinus opened; piece of bone removed; rapid recovery. Sinus is quite closed now.

to the splenic flexure, and down to the sigmoid and rectum. By this method the whole of the colon can be mapped out, and the time of the passage of the food through it can be accurately noted. If any stricture is present, the bismuth will accumulate behind it (see plate B).

This method is perfectly safe. It causes no inconvenience and no pain to the patient, and it furnishes information of much value to the physician or surgeon in charge.

Lung cases numbered 14—mostly phthisis, with the mottling or deep shadow over the lung, and the heart—usually a small one—drawn to the affected side: while the diaphragm showed defective action.

There were 17 cases of aneurism of the aorta. In some of these the enlarged shadow above the base of the heart could be seen to pulsate soon after the apex beat.

Fifty-seven cases were sent for suspected calculus in kidney, ureter or bladder, and in several of these the diagnosis was verified. The most striking one was a calculus in the bladder about 2 inches across, which had been growing there for 20 years —undiagnosed. On the screen the shadow was unmistakable.

Several calculi in the ureter have been seen. The usual situation was opposite the transverse process of the fourth lumbar vertebra.

In one case a kidney full of stones was met with, and it was removed by the surgeon. A few cases of single stones, usually in the pelvis of the kidney, were also seen; and these, too, were relieved by operation.

It is not easy to see small stones on the screen, and then a plate must be taken before a definite opinion can be given. In some hospitals it is the custom to take two plates, stereoscopically, and thus avoid the risk of founding the diagnosis on what might be a fault in one plate.

Another group of cases can be put down neither to accident nor disease. I refer to abnormalities of development, or those due to surgical interference—28 in all. These include 2 cases of cervical ribs, 1 of dextrocardia in an infant, knock-knees, flat-foot, spina bifida, and hip and knee after excision of the joints.

After these 725 cases have been excluded there remain 535 of minor injuries. These were cases of accident where it is

found on screen examination that no bones have been broken; cases where some foreign body is supposed to have been swallowed and no trace of it can be found; cases of disease of joints and bones where no osseous lesion can be detected. In many of these a plate also was exposed if the screen examination left any doubt as to the nature of the lesion, and the negative usually corroborated the shadows seen on the screen.

Thus the 1260 cases are accounted for. Now a word as to the numbers examined each month. Naturally, there were not many to begin with; but the numbers soon increased, and reached 120 to 130 a month. The following are the exact data:—

Cases Examined in X-Ray Room, Dundee Royal Infirmary.

February 1908	42
March ,,	77
April ,,	90
May ,,	100
June ,,	64
July ,,	125
August ,,	119
September ,,	85
October ,,	138
November ,,	94
December ,,	108
January 1909	135
	1177 and the balance in February 1909.

That gives a daily average of 4 or 5; but sometimes the number reached 15, and they took nearly 3 hours to examine. If, however, the lamp proves reliable, and the patients are ready, it would be possible now to examine as many within an hour. The screen examination can be rapidly done; it is the arranging and fixing of the photographic plate that takes up time.

Reference may now be made to difficulties encountered and the means of overcoming them.

The focus tubes used must be of medium hardness, *i.e.* the equivalent spark-gap must not be more than 6 inches, nor less than 2. In the early days this was a constant source of trouble. After a brief use the tube would get hot; its resistance would

fall; its E.S.G. become only 1 inch or less; and X-rays ceased to be emitted. Another tube had to be mounted and tested, and this took time. At present we are doing the whole work with two tubes, which are very hard to start with, but whose tension keeps very steady.

A second difficulty was how to bring patients from the Caird Hospital to the X-ray room in the Infirmary for examination. The exposure and jolting on the way deterred several; while for serious cases the journey was impossible. This is being overcome by getting an X-ray table and apparatus complete, surrounded by a portable dark tent. This is placed in Ward XIII., and when perfect will be a great boon to patients in the Caird Hospital.

A minor difficulty—how to lift a patient with a fractured thigh from the stretcher to the table without pain or danger of displacing the fragments, has been removed by the supply of canvas and poles for use in the X-ray room. A patient, however weak or sensitive, can now be gently lifted and laid on the table, and the canvas offers no obstruction to the passage of the X-rays.

The absence of prints of normal and injured bones for reference and comparison when a new fracture is examined is a drawback. Dr. Ironside Bruce's atlas is not quite satisfactory. I tried to make bromide prints of all the best marked fractures, but the labour was too much, and I had to give up the idea. If some friend would devote £20 or so to meet the expense of printing a series of normal and abnormal bones and joints, I believe it would be of great service in assisting the work done in the X-ray room.

So much for the year that is past. Now a brief glance forward. I fully expect the work of this department to increase. There are few surgical cases that might not have fresh light cast on them by the X-rays. Every fracture and dislocation, all cases of caries and periostitis, the situation of foreign bodies swallowed or inserted through the skin, the presence of calculi in kidney, ureter or bladder, can be thus shewn; while in cases of abscess or sinus, the injection of vaseline and bismuth will permit of the cavity being outlined in its full extent and along all its branches.

Medical cases are no less suitable for X-ray examination. Pneumonia, phthisis, pleurisy with effusion, empyema, cardiac enlargement or displacement, aneurism of the aorta, defective action of the diaphragm, can be diagnosed by screen examination

alone. Stricture of œsophagus and atony of the colon can be shown up clearly after a bismuth meal has been taken.

And these are only the outstanding examples of accident and disease of which the results can be easily demonstrated by the X-rays.

A NOTE ON THE USE OF THE ROTH INHALER FOR OPEN ETHER.

By J. STUART ROSS, M.B., F.R.C.S.,
Anæsthetist to the Deaconess Hospital, Edinburgh.

"Open Ether" being much to the fore just now, any apparatus which simplifies its use seems worthy of a little attention.

When dropping ether on the usual gauze-ladened mask, it is not very gratifying to the anæsthetist to see half of his ether being blown, by the expirations of the patient, into the atmosphere of the room, where it is calculated to do little good either to the patient or the surgeons. One of the objects of the Roth inhaler is to obviate this annoyance, by its system of inspiratory and expiratory valves.

The instrument is made entirely of plated metal, and consists of two detachable portions—a face-piece and a dome-shaped receptacle for the gauze, on to which the ether is dropped.

The face-piece is unusually well shaped, and fits the majority of faces, without the necessity for the use of any gauze packing to make an air-tight fit. The top of the face-piece is pierced by the valve for inspiration, the side by that for expiration. Both are easily taken to pieces when it is desired to cleanse them.

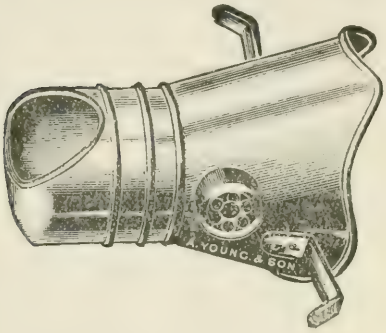
On to the top of the face-piece fits the dome, as shown in the engraving. The two portions can be rotated upon each other, so that, in whatever direction the head of the patient is lying, the aperture through which the ether is dropped can be brought into a convenient position. For use, the dome is lightly packed with gauze.

The instrument was introduced into this country by Mr. A. E. Morison of Sunderland, and is now fairly widely used in that, as also in the Edinburgh district. I have been using it for some time since it was shown to me by the makers, Messrs. Arch. Young & Son, of this city.

Personally, I believe that the valve area is too small, and have had it increased by 50 per cent. in my own instrument. I have also constructed, for my own use, a poroplastic cap for the dome, with an aperture in its side rather smaller than that in the metal dome. By the use of this the air supply can be temporarily diminished, which is sometimes an advantage during the induction

of anæsthesia—a process which, however, is best avoided with this instrument.

It is true that anæsthesia can, by the expenditure of a good deal of time, ether, and patience, be induced by this instrument in the majority of subjects. This is, as a rule, neither wise nor necessary. If the subject be a "good" one, I see no reason why use should not be made of the ordinary nitrous oxide-ether induction, in Hewitt's apparatus (a process which I may parenthetically remark I believe to be both safer and more pleasant to the patient than its popular rival, the ethyl chloride-ether sequence), while the troublesome alcoholic or otherwise "bad" subject is best dealt with as follows:—Begin with a mixture of chloroform and ether exhibited on a Blake cone or a Rendle inhaler, determining the exact proportion of the ingredient by the exigencies of the case in hand: as soon as the second stage of anæsthesia is reached apply the Roth, dropping on the ether slowly at first, until tolerance is established—freely, as soon as the breathing becomes regular. Full narcosis is rapidly established; but I often find that the operation may be allowed to begin before the last trace of conjunctival reflex is lost.



By this method the patient is spared a long period of inhalation of strong and icy-cold ether vapour, and yet is passed over the most dangerous period of the induction more safely than if a chloroform mixture were used to the production of full surgical narcosis. It is an adaptation of Hewitt's useful C.E.-ether sequence—the best means we possess of dealing with difficult subjects.

As regards the scope for this inhaler, I believe it will be found valuable in a certain class of case which ordinarily gives great anxiety and trouble to the anæsthetist. Short-necked alcoholic men do surprisingly well under it; in abdominal section cases which are giving trouble under a closed ether inhaler, in goitre cases, or any severe operation in the region of the neck, I believe that it will be found very satisfactory to both surgeon and anæsthetist.

The open method of giving ether has reconciled many to the use of this anæsthetic agent, who previously were satisfied with nothing but chloroform narcosis; but the indiscriminate use of the method is much to be deprecated, in that it will certainly cause a great increase in the number of cases of ether bronchitis and ether pneumonia. However satisfactory at the time is the narcosis, no guarantee can be given that *prolonged* inhalation of strong and very cold ether vapour will not be followed by grave respiratory trouble. It would be, I think, a great mistake if we allow the undoubted advantages of the method to tempt us either to use it where other methods equally safe at the time are available, or to continue its use in any individual case beyond the stage of the operation where it is distinctly indicated. It would therefore seem wise, when possible, to induce by some less chilling process than "open ether;" and, in a long case, to change to chloroform or a mixture as soon as that part of the operation where reflex shock is to be dreaded is passed.

If these elemental considerations are kept in mind we may hope that the method will continue to be appreciated and become widely used. But if it is abused, we shall probably have a repetition of the revolt which, in the last century, would have swept ether narcosis away altogether but for the timely introduction by Clover of the closed method.

MEETINGS OF SOCIETIES.

Edinburgh Medico-Chirurgical Society.

A CLINICAL meeting was held in the Royal Infirmary on 26th May, Dr. James Richie, President, in the chair.

Mr. Cathcart showed a case of mistaken diagnosis of malignant disease of the abdomen. He thought such cases important, in view of the numerous cancer cures that were advertised. He also showed a patient after double nephropexy by Billington's method, and a case of idiopathic distension of the colon two years after operation. There had been obstruction only partially relieved by enemata. The condition was due to spasm, and had been relieved by an opening in the left iliac fossa.

Mr. Dowden showed a number of cases of fracture of the upper extremity treated by a sling and early movement.

Professor Caird showed (1) a case of double amputation of the foot; (2) a case of multiple enterostomy for cancer. He pointed out that the clamps that were to come together in such cases should be distinguished by pieces of thread of corresponding colour; (3) a boy with good power of walking after double amputation of the leg.

Dr. Dawson Turner showed a number of cases after treatment by radium.

Dr. Gibson showed (1) a case of adipositas dolorosa in a woman who weighed 23 stones; (2) a case of lead-poisoning simulating progressive muscular atrophy; (3) a case of disseminated sclerosis with well-marked sensory symptoms; (4) a case of cerebellar tumour.

Mr. Wallace showed a patient after partial gastrostomy and a case of pancreatic cyst following injury.

Mr. George Cheine (for Mr. Hodsdon) showed a case of stricture of the rectum with nodules of scirrhus becoming colloid all over the peritoneum.

The ninth ordinary meeting was held on 2nd June, the President in the chair.

Mr. G. A. Berry opened a discussion on the symptomatology and causes of so-called eye strain, which will appear in the *Journal*.

Dr. George Mackay referred to the importance of the personal equation in determining the symptoms of eye strain. Some persons with large demands on accommodation had no headache, while others with trivial errors of refraction suffered. In some of the latter cases glasses had to be tried simply as an experiment. Too much import-

ance had been attached to "muscular inbalance," but minor degrees of vertical deviation might require prisms, and higher degrees, tenotomy.

Dr. Sym doubted whether megrim was a form of eye strain. He had not been able to trace a connection between the hemicrania and excessive use of the eyes. He doubted whether mental or moral aberrations could be attributed to eye strain. He thought the continual effort of interpreting confused images had more to do with headache than lid-pressure.

Dr. Sinclair referred to cases of young persons treated by glasses who were afterwards able to discard the glasses and the eye strain remained cured.

Dr. Goodall read a paper entitled "A Pharmacological Estimate of the Value of Commercial Samples of the Liquid Extract of Ergot, with Notes on Ergot Standardisation" (see p. 20).

Edinburgh Obstetrical Society.

THE seventh meeting of the session was held at 5 St. Andrew Square on Wednesday, 9th June, Professor Stephenson, President, in the chair.

Dr. John M'Gibbon showed (*a*) fibroid which caused severe symptoms; (*b*) fibroid which developed two and a half years after the menopause; (*c*) a vaginal elevator devised by Mr. Arthur Wallace, Liverpool.

Dr. Haultain showed a uterus with large glandular polypus associated with ovarian cyst, and removed for post-climacteric hæmorrhage.

The President read a paper "On the Value of Manipulative Action Combined with Axis Traction in the Use of the Forceps," which will appear in a future number of the *Journal*.

Dr. John M'Gibbon read a paper on "Peritonitis as a Complication of Fibroids, specially in Association with Torsion of the Pedicle, with an Illustrative Case."

The case described came under Dr. M'Gibbon's care in June 1908. The patient, single, æt. 31, was suddenly seized with violent abdominal pain and vomiting. Seen twelve hours later she presented all the clinical signs of acute peritonitis: pulse 120, temperature 103° F., with severe fixed pain in both iliac regions. Ten days later, after symptoms had subsided, operation revealed a fibroid with twisted pedicle. Subtotal hysterectomy was followed by a rapid and complete recovery.

OBITUARY.

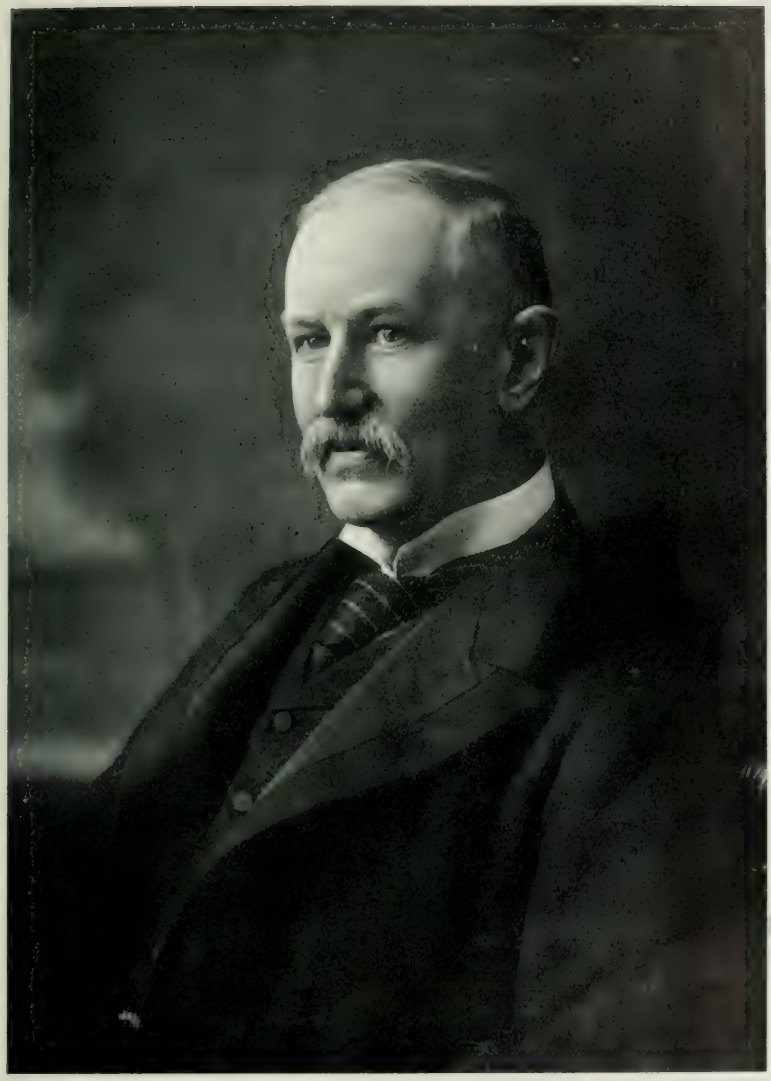
DANIEL JOHN CUNNINGHAM, M.D., Sc.D., LL.D., D.C.L.,

PROFESSOR OF ANATOMY IN THE UNIVERSITY OF EDINBURGH.

A LIFE of high ideal and of lofty purpose has been quenched all too soon by the death, on 23rd June, of Professor Cunningham. The bereavement from which we are now suffering cannot be regarded as anything less than a disaster to the Edinburgh Medical School, while the loss to natural science is nothing short of a calamity. A natural and a kindly impulse leads most men to say nothing but good of those who pass behind the veil, and the result is that sometimes words of praise are pronounced over careers marred by serious blots, or, still worse, characterised by purely negative qualities. In the case of him who has just left us there can be no fear of error in this respect, as any words of ours must be all too poor to describe a man whose singleness of aim and generosity of character were only equalled by his splendid achievement and profound influence.

Daniel John Cunningham was the son of the Rev. John Cunningham, D.D., and was born in the manse of Crieff on 15th April 1850. His early years were lived on the beautiful banks of the silvery Earn, to which fact he undoubtedly owed his favourite recreation of later days. He was educated at the Crieff Academy, and after leaving school he spent two or three years in a Glasgow office. With an early inclination towards the study of natural science, a business career became more and more distasteful to him; at the age of twenty he therefore determined to devote himself to the study of medicine, and accordingly entered the University of Edinburgh in 1870. From the beginning of his career as an undergraduate he was a man of mark. Ungrudgingly endowed by nature with splendid intellectual gifts, he set before him, as his first duty, a thorough training in all branches of medical science; he pursued this object with a steadfastness of intention and a tenacity of purpose which set him at once in the first rank amongst his contemporaries. In every department of knowledge to which he applied himself he excelled, and obtained highest honours when he took his degree. During his undergraduate career he was selected by the Professor of Anatomy, now Principal Sir William Turner, to act as one of the assistant-demonstrators, by which his love of the natural sciences was undoubtedly strengthened. Even at that early period of his life he showed his admirable powers of exposition: never satisfied without exact information himself, and insisting upon accuracy of knowledge in those whom he taught, he yet possessed the rare gift of enlisting their interest and arousing their enthusiasm.

After graduation, he was, for a couple of years, one of the Junior Demonstrators of Anatomy, and in 1876, after obtaining a gold medal



The late Professor Cunningham.

for his thesis on the Cetacea, he was appointed Senior Demonstrator to the University. From this time onwards he remained, with ever-increasing acceptance, the most popular teacher of anatomy in these islands. When he left Edinburgh in 1882 to enter upon the duties of Professor of Anatomy in the Royal College of Surgeons of Ireland, he was followed by the affectionate regrets of all from whom he then parted. His success at the Royal College was so great that a year later he was invited to succeed Professor Macalister in the Anatomical Chair at Trinity College. For twenty years he occupied this position with the greatest distinction, and threw fresh lustre upon an already distinguished office. He was not merely the idol of his own pupils, but he exerted an attractive force in virtue of which scientific inquirers from many lands gravitated towards the fair western metropolis. When Sir William Turner became Principal the eyes of all connected with the University of Edinburgh turned with one accord to Dublin, and he received a unanimous summons to the chair of the Monros and Goodsir and Turner. It is an open secret that he hesitated to accept the position offered to him, but loyalty to his old alma mater, and the belief that she stood in need of his services, led him to accede to the universal desire that he should return to Edinburgh. It goes without saying that he was received with boundless enthusiasm on every hand, and that he at once began to justify the warmth of his acclaim by the breadth of view which he brought to bear on the teaching of his subject, and the brilliance with which he illuminated its various branches. Although he felt compelled to yield to the invitation of his old University, it is well known that he loved Trinity College to the end, and he was always ready to place his services at the disposal of the University of Dublin if he could be of the least assistance. As a teacher of anatomy he has not had a rival in our time. Possessing a captivating individuality and a fascinating personality, he exerted a magnetic influence over those whom he was called upon to instruct, and evoked an enthusiasm which was contagious. Essentially modern in his tendencies, he summoned every recent method of demonstration to his aid, and could not rest till he was convinced that the means of instruction left nothing undone. This mingling of sympathetic consideration for the pupil, with exhaustive preparation of the methods, led to most admirable results and rendered the teaching of anatomy at his hands one of the most interesting paths of study.

Professor Cunningham has left behind him a wonderful record of splendid work as an original observer in human and comparative anatomy, as well as in the wider field of anthropology. In addition to numerous papers in the *Journal of Anatomy and Physiology*, of which he was the acting editor, and in other scientific publications, he published *Report on the Marsupialia brought home by H.M.S. Challenger*,

and the *Students' Guide to Dissection*, which he subsequently replaced by the *Manual of Practical Anatomy*. The Royal Irish Academy has a "Cunningham Fund," which is employed for the publication of work which attains a special standard of merit, and two papers by Professor Cunningham were selected for issue—"On the Lumbar Curve in Man and the Apes" (1886) and "On the Surface Anatomy of the Cerebral Hemispheres" (1892). To the *Transactions* of the same academy he contributed a "Memoir on Cornelius Magrath, the Irish Giant; a Research into the Connection which Exists between Giantism and Acromegaly" (1891); and to the *Transactions of the Royal Dublin Society* a "Memoir on the Microcephalic Idiot" (1895). He delivered before the Anthropological Institute in 1902 the third Huxley memorial lecture, of which the subject was "Right-Handedness and Left-Brainedness," for which he was awarded a memorial medal. In conjunction with Professor E. H. Bennett he wrote *The Topographical Anatomy of Congenital Inguinal Hernia* (1888). Of the *Text-Book of Anatomy*, published in 1902 by the pupils of Sir William Turner, he acted as editor and joint-author.

As a man of affairs he had great influence in the councils of the two Universities with which he was successively connected. His perspicuous foresight, his unflagging energy, and his dauntless courage rendered him a powerful leader, while his nobility of character, sweetness of disposition, and geniality of manner were of rare service to him in the unselfish exertions he made for the good of these institutions. It was the same as regards the learned societies in which he laboured without ceasing for the furtherance of modern science. In addition to being the contributor of original papers of the highest value, he took his share of the burden of management of every society with which he was connected, and laid all under a debt of gratitude to him for his unsparing exertions in their behalf. The Royal Societies of London and Edinburgh and the Royal Irish Academy had each the benefit of his aid, and two more particularly—the Royal Dublin Society and the Royal Zoological Society of Ireland—were placed by his generous labours under a special debt of gratitude.

Honours came to him, but were not sought by him. The University of Dublin conferred upon him its honorary degrees of M.D. and D.Sc.; St. Andrews and Glasgow added his name to their rolls of Honorary Doctors of Laws; and Oxford, at the celebration of the Tercentenary of Trinity College, asked him to accept its highest distinction by becoming an Honorary Doctor of Civil Law. At an early period he was invited to enter the fellowship of the Royal Society, while many learned societies and associations extended to him their honorary fellowship or membership.

The public weal owed much to his enlightened views and patriotic endeavours, and much of his time was occupied by difficult questions

of national importance. It is only necessary to recall his services as a member of the South African Commission to inquire into the management of the sick and wounded in the war, and of the War Office Committee on the standard of candidates and recruits for the army. But it may further be mentioned that he was the leader in carrying out the arrangements for the medical department of the Territorial Army in Scotland, and that he played the most important part in the establishment of post-graduate instruction in Edinburgh.

None could look at the late Professor without the instinctive feeling that he possessed a rare personality. His commanding presence lent great weight to all that he said or did, while his winning countenance had an alluring effect on those brought in contact with him. Often when engaged with him in public matters or in social intercourse, the thought has come to me how admirably the lines of one of my friends—addressed to another of the modern heroes of science—suited him :—

> "His brow spreads large and placid, and his eye
> Is deep and bright, with steady looks that still,
> Soft lines of tranquil thought his face fulfil—
> His face at once benign and proud and shy."

His character showed a rare combination of strength of mind and sweetness of disposition. Perfectly single in aim and steadfast of purpose, he never deviated by the breadth of a hair from the path which he conceived to be that of duty. In all his actions he showed unwavering staunchness and unvarying faithfulness, and these great characteristics of a strong nature were united in a rare degree with winning gentleness and charming courtesy. In all his intercourse with those whom he was brought in contact with the essential nobility of his nature and the generosity of his disposition exerted a fascinating influence, and no one was ever associated with him without being and feeling a better man in consequence. He was unwearying in his kindly consideration for others of every degree, and this rendered him beyond compare the best loved man of two great medical schools. The world was greatly the richer for his presence—it is vastly the poorer for his absence. Yet he has left with us not only the permanent results of great achievements but the undying influence of a lofty character, and in our sorrow that we shall never again see his sweet smile, or hear his cheery voice, or feel his warm grasp, we have to acknowledge our feelings of gratitude that such a man lived and moved amongst us as an example of all that is best in the man of science. With the painful sense of bereavement fresh upon his friends it is yet too soon to find any alleviation of our grief ; we must not, however, be selfish in our sorrow, and forget those with whom he was associated by family ties. To all of them our sincere sympathy is now reverently and lovingly tendered.

G. A. G.

RECENT LITERATURE.

CRITICAL SUMMARIES AND ABSTRACTS.

MEDICINE.

By J. S. FOWLER, M.D., F.R.C.P.,
Physician to the Royal Hospital for Sick Children.

Serum Diagnosis of Syphilis.

The Wassermann reaction has been the subject of a great deal of research during the past year, and it is now on a somewhat different position from that which it occupied at the time the writer last dealt with the subject in the *Journal* in February 1908. Further experience has amply confirmed its diagnostic value, and, in the opinion of practically all observers, a positive reaction may be regarded as certain proof of syphilitic infection. Along with this, however, has come evidence that the reaction is not truly specific; that is, it is not, as Wassermann at first supposed, a reaction between the syphilitic virus and the syphilitic antibodies, but is of a different character. The investigations which have led up to this discovery have thrown some light on the nature of the syphilitic process; they have also led to various simplifications of Wassermann's original process, and to some new tests, and there is every reason to think that very soon the clinician will have at his disposal a means of detecting syphilis as certain, and as easily applied as the Widal reaction at least, instead of, as at present, being compelled to have recourse to a properly fitted laboratory.

The Wassermann reaction is, of course, a complement fixation test, the principle on which it depends being as follows:— A hæmolytic system consists of red blood corpuscles, hæmolytic amboceptor and complement, and when these three elements are mixed, hæmolysis occurs. When, however, any two substances which will interact with each other, in the sense that antigen and antibody do, are added to the complement-containing element of a hæmolytic system before this complement is mixed with the red corpuscles and amboceptor, the antigen and antibody by uniting "fix" or "bind" the complement, prevent it from combining with the other two components of the system, and, in consequence, prevent hæmolysis = positive reaction.

As Wassermann originally performed the test, the antigen used was an extract of syphilitic liver, the reason for its selection being the abundance of syphilitic virus (spirochætes) it contained. Very early, however, it was suggested that the active "antigen" might be one

of the group of lipoids. Further research has proved the correctness of this supposition, and has shown, moreover, that it is not necessary to employ a syphilitic liver as a source of antigen, but that extracts of normal organs, particularly of heart muscle, serve equally well.

From this it follows that whatever the abnormal constituent of syphilitic serum which combines with the antigen may be, it is not a specific syphilitic antibody, comparable to those which have been demonstrated by the complement fixation test in tuberculous, dysenteric, and other infections. The reaction is evidently more nearly related to the process of hæmolysis, and it is now generally held that the abnormal constituent of the serum, to the combination of which with an antigen inhibition of hæmolysis is due (positive reaction), is a lipoid substance produced by pathological (syphilitic) metabolism of the tissues.

Lipoids.—Pflüger and most physiologists have taught that the vital activities depend essentially on proteins, but there is reason to suppose that the group of fat-like substances to which Overton gave the name of lipoids are equally, if not more, important. Lipoids are of three kinds:—(1) N and P-free cholesterin, fatty acids and lipochromes; (2) nitrogenous, but P-free, cerebrosides; (3) phosphatides, containing both N and P, the most important being lecithin. Lecithin and cholesterin are in some respects antagonists, and apparently figure prominently in the process of hæmolysis. In order that cobra venom may bring about hæmolysis, it must interact with something contained in the serum, for it will not hæmolyse washed corpuscles. The "something" in question is lecithin. Cholesterin antagonises the activating effect of lecithin on cobra venom. Mott suggests that the relationship between lecithin and cholesterin is as follows:—The red corpuscles may be regarded as a protein stroma holding hæmoglobin in solution, the whole being covered with a membrane consisting of a properly adjusted complex of the lipoids, cholesterin and lecithin, forming an osmotic membrane. As a result of a disturbance, chemical or physical, of the balance between the cholesterin and lecithin, this osmotic membrane, normally only permeable to small ions of Ca, Na, or K, becomes permeable to the large molecule of hæmoglobin. It is probable that all cells possess such osmotic membranes, and that cytolysis depends on physical or chemical changes on the membrane. Iscovesco looks on cholesterin as the most important of the antitoxic lipoids. His review of the literature of lipoids is too exhaustive and full of details to admit of being abstracted.

Under pathological conditions, lipoids occur in the tissue juices as a result of cellular disintegration. The syphilitic virus induces changes whereby large amounts of lipoid occur in the serum, yet, as the same lipoids are found in small amount in normal tissues, the specific character of the pathological change is manifested rather by

quantity than by quality. The substances which in hæmolysis play the part of antigens are lecithin bodies; those which play the part of antibodies are possibly cholesterin complexes. The reason for a syphilitic fœtal liver being so good an antigen is probably the amount of lipoid present, on account of the great cellular destruction caused by the numerous spirochætes.

Substitutes for Wassermann's "Antigen."—Contrary to what is the case as regards true bacterial antigens, the substance which combines with the syphilitic serum to fix complement can be extracted from syphilitic fœtal liver by alcohol. Alcoholic extracts of normal liver, and of heart, soaps, vaseline, bile salts, sodium oleate, taurocholate, glycocholate, and lecithin, may be used as antigens. Cholesterin is stated by some to have the same property, but according to Noguchi it is inactive, as also are cholin and neurin. The bile salts are less active than the lipoid bodies.

Simplified Methods of carrying out the Test.—Attempts to diminish the complication of the Wassermann reaction, and thereby to extend its usefulness, have been made along two main lines—(1) Some more convenient antigen than syphilitic liver is used. (2) A hæmolytic system is used in which human corpuscles are lysed, or in which the natural hæmolytic action of human serum to sheep corpuscles is made use of. (3) Certain quasi-chemical tests, based on the Wassermann reaction, have also been introduced. It is not proposed here to give the new methods in detail; originals must necessarily be consulted.

1. *Mayer and Proescher's Modification.*—As an antigen, sodium oleate is used; the hæmolytic amboceptor is rabbit's blood immunised against the corpuscles of the calf; sheep's corpuscles are used for lysis; fresh guinea-pig's serum is used to furnish complement. The method appears to be very little less laborious than the original technique of Wassermann.

2. *Fleming's Modification.*—This is based on Hecht's method, in which advantage is taken of the normal hæmolytic action of human serum on sheep's corpuscles; the serum to be tested is therefore made to supply complement and amboceptor. The materials required are alcoholic extract of heart, blood-serum, and washed sheep's corpuscles. As the original paper is so readily accessible, it is unnecessary to describe the test further than to point out as its advantages (1) the small amount of human serum required (no more than for the ordinary opsonic test); and (2) the doing away with a special immune serum. M'Intosh and others have offered as an objection to the tests of this type—viz. those which utilise the anti-sheep's corpuscles amboceptor of human blood—the variability and occasional absence of the amboceptor in different specimens of human blood.

3. *Noguchi's Method.*—The essential feature is the use of an anti-human amboceptor, which renders it unnecessary to have sheep's

corpuscles in carrying out the test. As Noguchi's reaction has attained more popularity than most of the other modifications, and as he has adapted it for clinical use, a somewhat more detailed description will be given. The following reagents are required:—1. Anti-human hæmolytic amboceptor prepared by injecting a rabbit with washed human corpuscles. 2. Complement—fresh guinea-pig serum. 3. Antigen —alcoholic extract of liver, &c., or 3 per cent. solution of lecithin in alcohol and normal saline. 4. Suspension of human corpuscles prepared by mixing 1 drop of normal blood to 4 c.c. of normal saline. 5. Serum to be tested, collected from 10 drops of the patient's blood. Six tubes are required. In one pair is placed one drop of the patient's serum, in the second pair a control syphilitic serum, in the third pair a drop of normal serum. Each tube then receives blood corpuscles, amboceptor and complement, and one tube of each pair, antigen. A negative reaction is shown by complete hæmolysis, a positive reaction by absence or inhibition of hæmolysis in the tube containing antigen. Noguchi has farther simplified the test for clinical work by drying the reagents on filter papers, and standardising them. Anti-human amboceptor slips are made by taking up the serum of an immune rabbit on filter paper, and drying; complement slips and lecithin slips are made in the same way. Each unit measures about 5 mm^2. These will keep indefinitely in a dry place. They are dropped by means of forceps into three pairs of tubes containing suspension of corpuscles, suspected serum, and the two control serums. The tubes can be incubated in the vest pocket. In 465 tests made by Noguchi's method the results were concordant with those given by Wassermann.

4. *Porges-Meier Test.*—In this test equal parts of blood-serum and 1 per cent. lecithin emulsion in normal saline are mixed. After incubation for 5 hours, and standing at a room temperature for 20 hours, the lecithin emulsion is precipitated by syphilitic, not by normal serum.

5. *Klausner Test.*—When 0·2 c.c. syphilitic serum and 0·7 c.c. distilled water are mixed, a well-marked precipitate appears in from 1 to 15 hours. Control normal serum gives no precipitate within the time limit, and only after 24 hours a very slight deposit. The above proportions of serum and water should be strictly adhered to. The precipitate is a globulin, soluble in normal saline and in acetic acid.

Nobl states that with the Porges-Meier test he gets results fairly comparable to those given by Wassermann's original method; the Klausner reaction is less decisive. He found that the lecithin solution might be replaced by sodium oleate. Noguchi thinks that the Porges-Meier test and the Wassermann reaction possess about equal diagnostic value. It has already been proved that globulin is present in excess in the cerebro-spinal fluid in tabes and general

paralysis. As tests for it, Ross and Jones recommend (1) Noguchi's butyric acid reaction, and (2) the ammonium sulphate test.

Of the simplified methods described, the two which seem to promise best, alike for convenience and reliability, are the Porges-Meier test and Noguchi's dried paper method.

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SURGERY.

By HENRY WADE, M.D., F.R.C.S.,
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Some Recent Contributions to the Surgery of the Ureter.

Wounds of the ureter, up to a comparatively recent time, were of the rarest occurrence. The progress of modern surgery in the treatment of intra-pelvic diseases has considerably altered this state of affairs, and in recent years a large number of cases have been recorded where the ureter has been unavoidably or intentionally divided.

Ureteral Fistulæ as a Sequelæ of Pelvic Operations.

Sampson [1] has recently contributed an article on the above subject. It deals only with cases in which fistulæ have developed after pelvic operations in the female. He mentions that in 156 hysterectomies for carcinoma of the uterine cervix in Dr. Kelly's clinique at the Johns Hopkins Hospital, in nineteen cases the ureter was accidentally injured, but only eleven instances of ureteral injury occurred in 4513 other major gynæcological operations. Injuries of the ureter have been reported in the operative treatment of nearly every pelvic condition, but, excluding those cases where the cause was contributory negligence, the ones in which wounds of the ureter have occurred during the performance of an intra-pelvic operation have either been those where the ureter was bound to the sheath, in which it lies by adhesions of inflammatory or neoplastic origin, or where a mass of tissue has become

adherent to the peritoneum over the ureter, and during the course of its removal that channel has been torn, wounded, or clamped. Where the ureter is adherent to its sheath, it is often unavoidably brought into the field of operation during the performance of a hysterectomy. Thus the ureter has been most frequently wounded in cases where this operation was being performed for cancer of the uterine cervix.

If the ureter is completely cut across, and there is an avenue of escape for the urine, a fistula usually develops, which shows no tendency to spontaneous cure by re-establishment of the normal channel; spontaneous occlusion of the ureter, with dilatation of it and of the renal pelvis above, and ultimate disintegration of the damaged kidney, may result. Sampson found, in his experimental investigations conducted on dogs, that the escape of urine into the peritoneal cavity or the pelvic cellular tissue planes was liable sometimes to lead to a fatal issue, and in debilitated subjects, especially where an associated infection is present, this may occur. He also found that longitudinal incisions of the ureter healed readily, and often with little escape of urine, when the channel below was fully pervious. The temporary application of a clamp may so devitalise the wall of the ureter as to lead to necrosis, sloughing of it, and the formation of a ureteral fistula a few days later. In the dog, a ligature tightly applied may sever the wall of the channel, and its lumen be afterwards completely re-established by a natural end-to-end anastomosis—a state of affairs which has also been observed by Clairmont and Ranzi[2] to occur when a ligature is applied in a similar manner round the small intestine of that animal. Injury to the blood-supply of the ureter, the periureteral arterial plexus, which extends the entire length of the ureter and up over the pelvis of the kidney and accompanies the ureter through the bladder, is liable to be followed by partial or complete necrosis of the wall of the channel. This results either in ureteral stenosis or in the formation of a fistula, according to the degree of damage done. Too free dissection of the ureter within its sheath, or too severe handling, may lead to a similar result, by leading to the extravasation of blood into its coats, and ultimate necrosis.

In the diagnosis of a ureteral fistula, it is very important to determine whether the fistula is partial or complete, as in the former case spontaneous cure, with restoration of the channel, is to be expected, but in the latter this is a very remote possibility. In this connection valuable information may be gained on cystoscopic examination, by observing the silent ureteral opening in cases of complete fistulæ. The use of the separator, combined with the injection of a soluble pigment, such as indigo carmine, which is excreted in the urine, renders the diagnosis absolute. Where the diagnosis of fistula has been made after operation, Sampson prefers to wait until the patient has regained strength before attempting any direct treatment

for the cure or alleviation of the accident. When operative treatment is indicated for complete or partial fistula, it may be undertaken in one of three ways:—uretero-vesical implantation, nephrectomy, or uretero-ureteral anastomosis. The latter is seldom possible; of the two former, implantation into the bladder should only be carried out where it can be done without submitting the ureter to too free dissection, or throwing too severe tension on it.

Uretero-Vesical Implantation.

Sampson strongly recommends the intra-peritoneal route. He has had experience of six cases in which he adopted the inguinal extra-peritoneal route, but he finds that this method is accompanied by greater difficulty in exposing the ureter, and that in it, it was necessary to free the ureter more than in the intra-peritoneal method. He uses a median incision. The peritoneum is incised below and parallel to the pelvic brim, and the ureter lifted up in a peritoneal flap. This serves to preserve the blood-supply of the ureter, and is of use in fixing it to the bladder. The bladder is drawn up and fixed to the side of the pelvis. The ureter is united to the former by three or four sutures. Extra-peritoneal drainage *per vaginam*, or through the groin, is adopted.

In cases where the ureter has been divided during the course of an operation, and uretero-vesical or end-to-end anastomosis is impossible, ligature of the ureter has been employed successfully—the patient recovering, and no subsequent fistula forming. Sampson, however, considers the better procedure to be, to deliberately establish a ureteral fistula by bringing the divided end of the duct up and fixing it to the wound, and later, when the patient has recovered from the shock of the first operation, to perform total nephrectomy if necessary.

Weibel,[3] in reviewing the lesions of the ureter, which have occurred in abdominal hysterectomies for carcinoma in Wertheim's clinique, mentions that out of four hundred such cases in only eleven was the ureter directly wounded during the operation. Eight times the ureter was completely cut across, once it was ligatured by mistake, and twice a lateral wound was made into it. In one case there was a double ureter on one side and one of these was cut through. It was immediately united to its undamaged companion, and no bad effects followed. After ligature of one ureter in a case of horse-shoe kidney, the patient died of uræmia. . . . In all the other cases the divided ureter was immediately implanted into the bladder, with a good result.

In addition to the risk of being wounded during the operation, the ureter in the radical operation for uterine carcinoma is exposed to the danger of subsequent necrosis. According to Weibel, in as many as 60 per cent. of cases this danger of necrosis is present.

In twenty-four cases fistulæ developed after operation, and three of these involved both ureters. Necrosis leads to the formation of a fistula at the earliest on the seventh day, and never later than the eighteenth day. The critical time is about the end of the second week. Most fistulæ heal spontaneously between the third and twelfth weeks, and spontaneous healing has been observed after three months. In thirteen cases spontaneous healing occurred. In seven, nephrectomy was performed successfully—one was cured by implantation of the ureter into the bladder. In three a fatal issue ensued.

In many cases where spontaneous healing had occurred, the functional after result, as demonstrated by cystoscopic and other examinations, was found to be impaired, and a weakening of the stream of urine was present on the affected side. Weibel advises that when symptoms of a pyelitis of increasing severity supervene from the presence of a ureteral fistula, nephrectomy in preference to vesical implantation should be carried out.

The experiences of the Jena and Freiburg cliniques are reported by Rauscher.[4] He has especially investigated the functionating power of the kidney after uretero-vesical anastomosis. This was determined by cystoscopic inspection, by sounding the ureters, by colour cystoscopy, and the other usual methods for testing the functionating power of the kidney. Resection of the ureter and subsequent implantation of it into the bladder had been carried out in thirteen cases of carcinoma of the uterus. Of these, three were cases in which both ureters had been divided. Seven times the uretero-vesical anastomosis was carried out by Krause's method, and of these, five showed a good functional result. In one case the renal activity was impaired, and in one a cicatricial stenosis was present at the site of implantation. In six cases the ureter was united to the bladder after the Sampson-Franz method, and in five of these the functional result obtained was excellent. In the three cases in which a double uretero-vesical anastomosis was performed this was done by the latter method. Both kidneys showed perfect functional activity, and this persisted. On these and other grounds Rauscher recommends the Sampson-Franz operation.

The Treatment of Extroversion of the Bladder by Implantation of the Ureters into the Rectum.

There is now on record a large number of cases in which the above-mentioned procedure has been adopted, and a sufficient time has elapsed to allow of the estimation of the functional results which follow it. Thomson[5] and Dowden[6] have recently recorded in this *Journal* cases in which they have united the ureter to the large bowel. In the latter case the procedure adopted was to implant the duct into a loop of bowel excluded by lateral anastomosis of the iliac and pelvic colon.

Buchanan[7] has also recorded a case. His paper deals mainly with the remote results of implantation of the ureters, and especially with those cases in which the Bergenhem method (Peters's operation, as it is usually called in this country) has been performed. He gives a very complete and lucid analysis of the after result of uretero-rectal and trigono-sigmoid anastomosis. Trigono-sigmoid anastomosis—the intestinal implantation of the intact ureters with part of the bladder wall attached—which was first performed by Maydl in 1892, has now been performed, strictly according to the original method, upon eighty patients, with a mortality of 28·7 per cent. Of the twenty-three patients dying after Maydl's operation, the cause of death has been recorded in twenty, and of these, seven died of peritonitis, and nine of pyelo-nephritis and anuria.

Bergenhem, in 1894, was the first to implant the ureters separately, and with a rosette of bladder attached, into the rectum by the extra-peritoneal route. Records are available of twenty-six cases in which Bergenhem's operation has been performed. The mortality has been 11·5 per cent., and in two of these cases it was due to ascending renal infection. Of the ninety-eight patients who survived Maydl's and Bergenhem's operation, eleven died subsequently of ascending renal infection. These cases, however, must not all be considered as ones in which the infection had travelled up from the bowel, for, as Berger has shown, of seventy-four patients born with extroversion of the bladder and undergoing no surgical treatment, only twenty-three lived up to the age of twenty, the others dying of pyelo-nephritis, which the exposed position of the ureters is liable to cause. In some of the cases mentioned it is therefore probable that the damage had been done before the operation was undertaken. Of the sixty-four cases which were alive when last reported, fifteen had survived the operation for from six to twelve years.

The important factors in the prevention of ascending infection after ureteral implantation, according to Buchanan, are—that each ureter should pass in a direct course without kink or twist to the point of entrance into the bowel. There should be no injury by forceps, knife or needle of or near the ostium that could cause a cicatricial narrowing of the passage. The intra-intestinal portion should keep its position without tension. No injury should be done the ureter by retention sutures. The ureteral catheter should be used as a guide in dissection during operation, but not as a conductor of urine afterwards. No dilatation of the sphincter ani should be practised, and only a rubber tube used to prevent distension.

In order to minimise the risk of infection of the kidney from the bowel, Ball,[8] in the case of a boy upon whom he performed extra-peritoneal uretero-rectal anastomosis, gave 5 grs. of salol three times a day for a week prior to operation. The alimentary canal was

cleared out by the free administration of calomel, and the usual enema given. Opium was given to check peristalsis, and when the child was on the table the rectum was washed out with cyllin.

The complete relief from their state of former misery which so many of the patients obtain after this operation is illustrated well in a case recorded by Rigby.[9] The infant upon which he performed a modified Maydl's operation was aged six months. It was in excellent health eight months later, and its mother stated that it usually passed urine at intervals of from two to three hours, and sometimes as long as seven hours intervened. Nocturnal incontinence was the exception.

There is still an occasional surgeon who is dissatisfied with the usual treatment adopted for ectopia vesicæ. Diakonow[10] has devised an operation which is a modification of Subbotin's vesical rectal anastomosis. In his operation a cuff of bladder wall is dissected up, and from it a new urethra made, which passes within the sphincter ani and opens in front of the rectum. It is performed extra-peritoneally, and requires a subsequent operation to form an anterior bladder wall. He claims by his operation to render a kidney infection by intestinal content impossible.

Knaggs[11] describes a modification of Bergenhem's operation which he has performed for extroversion of the bladder, in a woman of thirty-one years of age. A preliminary hysterectomy was performed to allow of the implantation into the rectum of a portion of the bladder containing the ureteral openings.

Beresnegowski[12] gives the results which have followed the implantation of the ureters into the rectum in Tichow's clinique. The operation was performed twenty-nine times, for cases of ectopia vesicæ, incontinence of urine after perineal lithotomy, and inoperable vesico-vaginal fistulæ. Nine cases died after operation. The method practised was by the performance of a laparotomy, division of the ureters above the bladder, and the anastomosis of these with the rectum through a flap of bowel. He recommends, for extroversion of the bladder in the male, Maydl's or Bergenhem's operation; in the female, the implantation of a flap of bladder; in vesico-vaginal fistula, Tichow's operation.

Ureterostomy.

Short circuiting of the urine in advanced cancer of the bladder and prostate.

Hurry Fenwick[13] advises, for the relief of the suffering which such patients endure, that a bilateral ureterostomy be performed through small transverse incisions over both iliac crests. By means of a preliminary ureterostomy, he claims he can now remove the entire bladder with much greater likelihood of a successful issue.

Ureteral Calculi.

These, although common, do not often require removal when *in situ*.

Woolsey,[14] in a recent article, gives cases illustrative of the close similarity which may exist in the clinical features of acute appendicitis and calculi in the ureter. In his opinion, it is an excellent rule to examine all cases of appendicitis without typical signs of inflammation for hæmaturia, and especially, if the latter be found, to subject these to an X-ray examination before performing appendectomy. He warns against mistaking false shadows arising, *e.g.* from calcified lymph nodes, ossified areas in the pelvic ligaments, for the true calculi. These and other sources of photographic error are also referred to by Rochard.[15] When removal of a calculus in the pelvic ureter by operation is necessary, Woolsey recommends that the peritoneal cavity be opened through a small incision, as he has found this of so great value in locating and exposing the stone. Prior to the removal of the stone the peritoneum is carefully closed. After removal of the calculus he introduces only two or three sutures of fine catgut, and does not attempt accurate apposition of the edges of the divided ureter. Slight leakage of urine usually occurs; this, however, soon disappears.

Suturing of the Ureter.

In an article describing an elaborate experimental investigation of this subject, Alksue[16] mentions, that of the dogs upon which he performed end-to-end anastomosis of the ureter, 10 per cent. died, and 24 per cent. developed a temporary fistula. In those that recover, the chief danger is the development of stenosis.

In his investigations he exposed the urinary tract in certain cases, by splitting the bladder and laying bare the ureters in the living animal, and by this means saw that the normal wave of contraction always suffered an interruption at the place of suture. The urine became dammed back, in consequence, at this level, and it was only when a sufficient quantity had collected that the distal portion of the ureter was stimulated to contract. Temporary hydronephrosis and leakage were liable to result from this state of affairs.

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OBSTETRICS AND GYNECOLOGY.

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The Role of the Perineal Body during Labour and the Results of its Rupture.

Paramore (*Trans. of the Royal Society of Medicine*, Obstetrical Section, January 1909), following on previous papers by himself and others, further elaborates his views regarding the support of the pelvic viscera and the part played by the fascial and muscular structures of the pelvic floor. He maintains that "the perineal body plays no part in the support of the viscera, nor does its rupture facilitate prolapse." He further holds that the influence of the perineal body during labour is anything but a favourable one. The head ought to come down to the pelvic outlet fully flexed, and the presenting part is thus ovoid in shape. In order to pass in the easiest manner possible it is essential that this ovoid should come down at right angles to the plane of the pelvic outlet. The lower pole passes the aperture of the sphincter muscle of the vagina—the pubo-rectalis part of the levator ani—in this position, but immediately this pole is through it impinges upon the resistant perineal body which is below and in front of the posterior commissure of the sphincter muscle. This resistance in the posterior wall of the vagina determines extension of the head, so that the ovoid becomes at right angles to the plane of the vulvar aperture. This means that the ovoid is no longer at right angles to the plane of the aperture of the pubo-rectalis, with the result that this muscle has now to grasp, not a circle of the fœtal head, but an ellipse. This subjects the muscle to an increased pressure, resulting very often in its over-stretching or laceration, and this he believes to be the cause of prolapse. If, on the other hand, the perineal body is lacerated early, the extension of the head is not required, so that an elliptical part of the head does not engage in the sphincteric plane and no laceration of the muscle is

produced. This accounts for those frequent cases of complete laceration of the perineum which are not followed by prolapse. The author holds that if perineal laceration be prevented either by opposing the advance of the fœtal head, or by directly supporting the perineum, much harm may be done to the pelvic floor, and he looks upon an early tear as often a "blessing in disguise." It is not surprising to find after the expression of these views that Paramore pays little attention to the careful suture of the lacerated perineum, except in the case of tears involving the anal sphincter. In other cases he inserts sutures simply for the control of hæmorrhage and the prevention of sepsis.

He advocates the method of Toff for preventing early and continued extension of the head at the outlet. When the head appears at the vulva two fingers are placed between it and the pubes and backward pressure and traction exerted, while, with the other hand above the anus, the head is pressed downwards and forwards. By this manœuvre both perineal laceration and over-stretching of the levator ani muscle is prevented.

Early Rising in the Puerperium.

In the January number of this *Journal* we referred to the results obtained by various recent advocates of this method of treating puerperal patients—first drawn attention to by Küstner some eleven years ago, when Brutzer reported on 1000 cases treated in Küstner's clinque along the same lines and with the same beneficial results as those recently claimed. In the *Zent. f. Gynäk.* of May 1909, Hüffell gives the results for the Erlangen Maternity last winter. 150 out of the 234 puerperæ were got out of bed from the 2nd to the 4th day instead of the 8th or 9th day as formerly. The contra-indications in the other cases were extensive tears, rise in pulse or temperature, anæmia, weakness, affections of heart, lungs or kidney. The morbidity for those so treated was 8 per cent.—less than under the old régime. There was no appreciable effect on the lochial discharge, or on the height of the fundus on dismissal on the 9th day. As to later results, only 46 reported themselves after one month. In 27 the pelvic organs were normal; in 11 there was retroflexion; in 3 retroversion; in 2 affections of the appendages.

Decidual Change in the Endometrium due to Causes other than Pregnancy.

Goodall (*Amer. Journ. of Obstet.*, March 1909) adds 4 cases to those already recorded, where a distinct and definite decidua has formed in the uterus apart from pregnancy. The recognition of the possibility of this occurring is most important from the medico-legal

point of view. Up till recent years the presence of decidual cells was always regarded as proof positive of a recent pregnancy, but this view must now be abandoned. In the author's cases two were the subjects of very extensive pelvic tuberculosis with occlusion and distension of the tubes, one had a long-standing double salpingitis with occlusion due to gonorrhœa, and the fourth had double hydrosalpinx—all conditions which rendered the occurrence of pregnancy impossible. In each case the uterine mucosa as removed by the curette was very abundant, and on microscopic examination presented the typical picture of the decidua of pregnancy which had been retained *in utero* for some little time after its separation. There was a definite division into compact and glandular layers, and the decidual change round the deeper blood vessels was of the same nature as that ordinarily met with. Goodall believes that the change is due to a combination of chronic pelvic inflammatory changes acting upon a susceptible patient.

Ligation of Pelvic Veins for Puerperal Pyæmia.

Vineberg (*Amer. Journ. of Obstet.*, March 1909) points out that in cases of puerperal fever attended by marked rigors and swinging temperature, without definite signs of peritonitis and without a local deposit in the pelvis or uterus, the pelvic veins are the parts affected. They have undergone thrombosis, and the thrombus is septic. Either the iliac or the ovarian veins or both may be affected; in the case of the ovarian it may in thin subjects be palpated through the abdominal wall as a thick tortuous cord. As a rule this thrombosis of the pelvic veins is unattended with pain. In most cases organisms, usually streptococci, can be cultivated from the blood. Several men have operated on such cases with a view to excising completely the affected veins, and the author states that in 44 cases so dealt with there have been 19 recoveries. In the case which he himself records the patient had had a swinging temperature from the 5th day of the puerperium, and the operation was performed on the 38th day. The right ovarian vein was found to be thrombosed and thickened to the size of the thumb right up to the inferior vena cava. It was ligatured just at its entrance to the vena cava, and a second ligature was applied close to the uterus, and the appendages on that side and the vein were excised by the Paquelin cautery. No other veins appeared to be infected. The patient improved for a time, but died on the 52nd day. At the post-mortem it was found that thrombosis had extended in the inferior vena cava from the point of entrance of the ovarian vein down into the common iliac and its branches. In discussing the value of operative interference in such cases the author believes that it has quite a place, as the record of 19 recoveries in 44 cases is a good one, and he believes the proportion of cases recovering would be increased

if the cases were operated on earlier. The operation by the trans-peritoneal route has given better results than the extra-peritoneal one, as the exact extent of the involvement of the veins can be seen, and if the cautery is used for the excision there is little danger of infection of the peritoneum.

Scopolamin in Gynecological Operations.

This drug promises to be of such value in gynecological operative work that we give Bliniansky's observations on its effects on pulse and temperature in Selheim's clinique (*Zent. f. Gyn.*, 1909, No. 9). In 32 cases it was used in patients suffering from anæmia, cardiac weakness or tuberculous conditions, who had to undergo minor gynecological operations. In one-half there was no affection of the pulse-rate, in 10 there was slowing, and in 6 there was increase; but the slowing is attributed not to the drug but to the condition of the patient. In the second group of 10 cases it was used for purposes of examination combined with the administration of ether and chloroform. On the same evening there was noticed an average diminution in the pulse-rate of 5 beats per minute. The third group comprised 25 cases of major operations, in which scopolamin was combined with lumbar anæsthesia (stovain) without any effect on pulse or temperature, which could not be accounted for by some other cause than the action of the drug.

Vaginal Medication.

Local applications are made so frequently *per vaginam* in gynecological therapeutics that the question of the best medium for these is of importance, and a paper by Higuchi (*Arch. f. Gyn.*, Bd. lxxxvi. 1909), giving his experience in the hospital at Tokio, is of interest. Water, glycerine and cacao butter are the favourite media. A 10 per cent. solution of iodide of potassium in glycerine, water, or in 1 in 3 cacao butter was applied to the vaginal mucosa, and the presence of iodide in the urine ascertained by the chloroform test. Its presence was detected in 22 minutes after application in cacao butter, in 45 minutes after water, and not for 2 hours in the case of glycerine. Further, the rate of absorption varies in the same patient from time to time, and diminishes with increasing age. It is slower in multiparæ than in nulliparæ, and towards the end of pregnancy as compared with its commencement. Glycerine, from its hygroscopic action, withdraws serum from the tissues, and sets up a serous discharge, which may in part explain the slower absorption of the iodide. But from these observations it is evident that, to get the full benefit of ichthyol or other applications, vaseline or oil is a better medium than glycerine.

Sarcomatous Degeneration in Uterine Fibroids.

Schumann (*Amer. Journ. of Obstet.*, March 1909) records three cases of fibroid of the uterus in which there was distinct evidence of sarcomatous change. The sarcoma in each case was of the spindle-cell type, and from a study of them the author is inclined to the view that the sarcoma arises by a direct metaplasia of the cells of the tumour, and is not derived from tissue outside the tumour with subsequent invasion. In one of his cases the ordinary fibrous tissue could be seen lying between areas of definite sarcomatous growth, and round the periphery of the tumour the structure was that ordinarily met with in fibroids. He quotes the opinions of other observers such as Richer and Moraller, who hold that since sarcomatous metaplasia of unstriped muscle cells and connective tissue cells is not met with in other conditions, its occurrence in uterine fibroids must be regarded as doubtful, especially as the actual transformation has never been definitely demonstrated. While admitting that the occurrence of a sarcomatous change in fibroids is rare—1·4 per cent. according to Noble's statistics—he holds that it is sufficiently frequent to offer an additional reason for the complete removal of all fibroids.

PATHOLOGY.

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Bacillary Meningitis of Non-Tuberculous Origin.

Excluding meningitis due to the meningococcus, the pneumococcus, and various pyogenic cocci in pyæmic affections, there remains a not inconsiderable group of acute infections of the cerebro-spinal meninges, due to a variety of bacilli. Thus it has been recognised for a considerable time that, apart from the tubercle bacillus, the typhoid bacillus, the bacillus coli communis, and the bacillus of anthrax are each capable of inducing acute meningitis. In most cases, however, we have evidently to deal with a generalised infection, and a primary infection with these organisms is not usually described. Pfeiffer's bacillus of influenza has also been described as capable of causing acute meningitis. In investigations of epidemics of meningitis, quite a number of observers have described from time to time, either together with the pneumococcus and the meningococcus or with diplococci belonging to the same group, or, lastly, in pure culture, Gram-negative bacilli, whose nature has not yet been accurately determined. An important paper by Dr. Cohen[2] appears in the *Annales de l'Institut Pasteur* of

April 1909, entitled "La Méningite cérébro-spinale septicémique." His communication deals specially with a new micro-organism, which he describes as presenting in the tissues the morphological appearances of Pfeiffer's bacillus, from which, however, he considers that it can be differentiated with certainty. He points out the present-day doubt as to the exact etiological *rôle* of the bacillus of Pfeiffer in the causation of influenza, and quotes the work of various authors who have isolated Pfeiffer's bacillus in other diseases, such as chronic tuberculosis, whooping-cough, measles and scarlet fever. In other cases which presented the clinical characters of influenza, other organisms, such as the pneumococcus and the micrococcus catarrhalis, were present. It may be, as he suggests, that Pfeiffer's bacillus in a non-virulent condition may lead a saprophytic existence in the respiratory passages, but on occasion its virulence may become exalted, and the typical clinical picture of "la grippe" may be then produced. Dr. Cohen's paper is founded on the personal study of three cases of acute meningitis, from each of which the same organism was recovered, and in each of which the meningitis was apparently only a part of a generalised infection of the body with the organism. In the first case the clinical symptoms were characteristic of an acute meningitis, but there were also indications of respiratory involvement. Lumbar puncture yielded turbid fluid, from which a pure culture of a minute bacillus, having the general characters of Pfeiffer's bacillus, was obtained, but intravenous inoculation of a culture in a rabbit led to a rapidly fatal true septicæmia. The patient, a child of four months, had been ill for several weeks, and died the day after admission. Post-mortem there was found purulent lepto-meningitis, with areas of broncho-pneumonia at the bases of the lungs, and an early empyæma on the left side. The second case, in a child of about a year old, also terminated fatally. In this case the symptoms began with sudden and intense excitement. Four or five days later there was distinct stiffness of the neck, the fontanelle was tense, Kernig's sign was present. Lumbar puncture again yielded turbid fluid. There was a progressive dulling of consciousness, with signs of pneumonic consolidation at the base of the right lung. Convulsions occurred about a week after admission. Pure cultures of the same organism were recovered from the cerebro-spinal fluid, from the circulating blood, and from a purulent rhinitis which developed. The child died comatose, about ten days from the beginning of the illness. No sectio was obtained.

In the third case, a child of eight months old, the illness apparently began with pneumonic symptoms. A week after admission the respiratory condition was apparently improving, but there was slight head retraction and rigidity of the neck, and some œdema at the back of the left wrist. Three days later there was increased rigidity of the neck, Kernig's sign was present, there was no loss of consciousness.

Consciousness gradually became clouded, however. Turbid fluid was again obtained on lumbar puncture, and convulsions appeared. Death occurred about eleven days from the beginning of the symptoms. A post-mortem examination was not obtained in this case either, but during life the same organism as was seen in the first case was recovered from the cerebro-spinal fluid, from the circulating blood, from serous fluid obtained by puncture into the substance of the lung, and from the inflammatory exudate of a suppurative arthritis of the left wrist.

Morphology and Cultural Characters of the Organism.—In the cerebro-spinal fluid the organism appeared in the form of short, slender, feebly-staining, Gram-negative diplo-bacilli, sometimes occurring in chain form. Cultivation of the organism on rabbit blood-serum yielded, in twenty-four hours, small discrete, transparent, dewdrop-like colonies. These became larger and more grey and opaque in four or five days, the colonies showing a tendency to become confluent. Films from a twenty-four hours' growth showed the organism in a cocco-bacillary form. The ends of the bacilli were rounded, and stained more intensely than the centres. Involution forms appeared very rapidly ; long twisted filaments and swollen, badly-staining forms were observed. On ascitic agar, growth was feeble, and filamentous forms were numerous. No growth was obtained on peptone agar. On guinea-pig blood-agar, large pear-shaped involution forms in clumps, and long, thread-like forms, showing in their course large chromatic granules, were observed. The organism was non-motile. No growth was obtained below 26° C., or above 40° C. ; the optimum temperature was 37° C. The organism is a strict ærobe. It is easily killed by drying. Cultures must be kept moist, and to keep the organism alive sub-cultures must be made at not more than from eight to ten days' interval.

Blood-serum from case 2 caused marked agglutination of the bacillus, with a dilution of 1 in 4 ; sluggish agglutination at 1 in 10, and none at 1 in 25. The serum of a healthy person caused no agglutination, even with a dilution of 1 in 2. While admitting that this only indicates a feeble agglutinin reaction, the author has been able to show, by complementary fixation method, that the serum possessed a marked sensitising power on this microbe. The fact that in cases 2 and 3 the organism was demonstrated in the blood during life, raises the old controversy with regard to the presence of Pfeiffer's bacillus in the circulating blood. Pfeiffer and his school deny the presence of the influenza bacillus in the blood. Canon and his followers claim to have isolated it. This difference of opinion raises the question whether Pfeiffer and Canon were dealing with the same organism. It is possible that there is a whole group of Pfeiffer-like organisms, closely allied but with distinguishing features.

Animal Experiments.—Pfeiffer's experiments with his own microbe show that animals generally resist very considerable doses. The rabbit is apparently most susceptible, but only succumbs under large intravenous or intra-peritoneal doses. He never in these experiments found the organism in the blood, and therefore concludes that death is due to a pure toxæmia, and not to a real septicæmia. Cohen has repeated Pfeiffer's experiments with four strains of the influenza bacillus, and confirms on the whole Pfeiffer's original statement. Only in one of the experiments were a few organisms demonstrated in the heart blood after death. Subcutaneous inoculation of the organisms gave no result.

In striking contrast to these results with the Pfeiffer organism were the results obtained by Cohen in the case of the organism isolated by him in the three cases mentioned above. Intravenous inoculation in rabbits gave rise to a rapidly fatal septicæmia, with evident multiplication of the bacilli in the blood. Subcutaneous inoculation produced a subacute infection, which, however, invariably terminated fatally, and the organism was recovered in pure culture, not only from the heart blood, but from the inflammatory exudate in the pericardium, peritoneum, meninges, &c. In films from the peritoneal and pleural pus, the bacilli, which were very short, showed a diplococcal arrangement, and closely resembled pneumococci morphologically; they were, however, Gram-negative.

Vaccination and Serotherapy.—Attempts to vaccinate animals against Pfeiffer's bacillus have given no constant or encouraging results. On the other hand, Cohen, working with the organism he has isolated, has shown that, by subcutaneous inoculation of cultures, at first of some age, later of forty-eight hours' growth, followed by subcutaneous intra-peritoneal and intravenous injections of virulent cultures, rabbits may be protected against an intravenous inoculation of 8 c.c. of broth culture, 0·1 c.c. of which would have determined a fatal issue in an unprotected animal. In the same way, while the serum of an animal vaccinated against Pfeiffer's bacillus appears to have little or no action, Cohen has been able to prevent a fatal infection of guinea-pigs and rabbits from the bacillus of meningitis by the preventive injection of from 3 to 5 c.c. of the serum of a rabbit strongly immunised against this microbe.

The differentiation of Pfeiffer's organism from the bacillus of meningitis is also possible by the agglutinin reaction. The serum of a rabbit immunised against the latter organism agglutinates the bacillus, even with a dilution of 1 in 100, but has no effect on Pfeiffer's bacillus, even with such a low dilution as 1 in 10. This same immune serum has a distinct bactericidal action on the meningitis bacillus, while on Pfeiffer's organism the action is feeble or absent. Similarly the fixation reaction (Bordet and Gengou) and conglutination reaction

(Ehrlich and Sachs) enable one to further distinguish between these two microbes.

Without these modern tests Cohen points out in a review of the literature on influenzal-meningitis how easy it is to understand that in the past these two organisms have been confused with one another. For example, he quotes a case recorded by Dudgeon and Adams[4] as one of influenzal-broncho-pneumonia with multiple arthritis. The organism in this case (recovered in pure culture) may well have been the bacillus which is now described by Cohen.

There can be little doubt that this organism has frequently been mistaken in the past for Pfeiffer's influenza bacillus, and possibly for other micro-organisms. In German literature on the bacteriology of meningitis one finds references not infrequently to "typhusähnliche" bacilli, but in most cases the description leaves the positive identity of the organism doubtful. Undoubted typhoid bacilli have been isolated from time to time. For instance, Stoevesandt[10] in 1906, in an account of an epidemic of cerebro-spinal meningitis in Kiel, found it in the cerebro-spinal fluid along with tubercle bacillus. In the same epidemic he isolated *bacillus coli communis* in a case of meningitis in a child of two years, apparently arising from a bacillus coli cystitis. In another case occurring in the same epidemic, Stoevesandt found a pleomorphic bacillus, and figures it in an illustration. He does not, however, commit himself in regarding this organism as the cause of the disease. Von Hibler,[5] in a case of meningitis, found Gram-negative diplococci in the meningeal exudate, but in anærobic cultures therefrom he isolated an organism belonging to the actinomyces group, which, but for its anærobic properties, evidently resembles Stœvesandt's organism pretty closely. Darling and Wilson,[3] in the Belfast epidemic in 1907, also described in a case of meningitis a pleomorphous organism, coccal at times, but in certain media showing a tendency to bacillary formation. Symmers[11] has recently described two cases of cerebro-spinal meningitis associated respectively with the bacillus typhosus and the bacillus enteritidis (Gaertner). The occurrence of those bacilli in different countries in the cerebro-spinal fluid in cases of meningitis is evidently not so rare, and the results cannot be explained as merely due to accidental contamination. The present writer, in 1907,[6] in the course of the Edinburgh epidemic, studied two cases of meningitis in which bacilli closely resembling or identical with the organism now described by Cohen were present. Both cases terminated fatally; in the second a sectio was performed, and the diagnosis of lepto-meningitis confirmed. In this case also [7] the organism was cultivated from the cerebro-spinal fluid during life, together with a diplococcus whose precise nature was not determined. Since then the present writer has studied, in conjunction with Dr. James Ritchie, other five cases of meningitis associated with what he believes to be

the same organism. In none of these cases were true meningococci recovered in culture. In one case[9] the patient presented very similar symptoms to those seen in Cohen's cases. A clinical account of this case was given by Carmichael.[1] Here the organism was isolated during life from the cerebro-spinal fluid, the circulating blood, and from the purulent discharge from a septic arthritis which developed in the ankle and elbow-joints. It was described as a pathogenic leptothrix. At first, on recovery from the tissues, it was very feebly motile, but in subsequent cultivations it became actively so. It presented a characteristic growth on potato, and was regarded as belonging to the typhoid coli group. It was actively pathogenic towards mice, but not towards guinea-pigs and rabbits. A fatal meningitis was induced in a monkey by a subdural spinal injection of a culture. In spite of minor differences, it is evident that it was identical with, or at least closely related to, Cohen's bacillus of septicæmic meningitis. In this case there was a terminal pneumococcal infection. A similar case has been recently recorded by Milligan.[8] In the discussion which followed his communication there was a tendency to regard the pneumococcal infection as primary. In the case recorded by Dr. Ritchie and the present writer there was no doubt whatever that the leptothrix invasion was primary. It was further pointed out in the same communication that there was experimental evidence in favour of the view that in some way the leptothrix seemed to break down the resistance of the tissues to secondary invasion.

In conclusion, it must be admitted that Cohen's contention for the existence of a special form of meningitis is amply justified, and further that it is due to a Gram-negative bacillus which has frequently in the past been confused with, and mistaken for, Pfeiffer's influenza bacillus and the bacillus of typhoid. That it is invariably associated with a generalised septicæmic or pyæmic infection may be fairly doubted, and its relations to Gram-negative and Gram-positive diplococci including pneumococci in the cerebro-spinal fluid, and to those various pleomorphic bacilli with which it has been associated in certain cases, have still to be accurately determined. Cohen's experimental results in rabbits, in the direction of preventive and curative inoculation, are most encouraging, and indicate the proper line of treatment for such cases.

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MEDICAL JURISPRUDENCE.

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The Average Weight of the Normal Thymus Gland.—*Vierteljahrsch. f. Gericht. Med.*, Bd. xxxvii. H. 1.

Professor Hammar of Upsala records the average weights of the thymus gland obtained from 126 cases of individuals dying while in a state of apparent good health.

In newly-born children the average weight was 13·26 grm.; in the age period 1-5 years, 22·98 grm.; 6-10 years, 26·1 grm.; 11-15 years, 37·52 grm.; 16-20 years, 25·58 grm.; 21-26 years, 24·73 grm.; 26-35 years, 19·87 grm.; 36-45 years, 16·27 grm.; 46-55 years, 12·85 grm.; 56-65 years, 16·08 grm.; 66-75, 6 grm.

He regards measurement of the gland as worthless, since there is no fixed ratio between size and weight. It is also of importance that statistics should deal only with healthy persons dying suddenly, since in all diseased processes affecting nutrition the thymus gland undergoes considerable involution. V. Sury in his recent paper on "Thymus Death" has given the results of his observations upon the weight of the thymus gland in healthy, well-nourished children dying from acute conditions during the first year of life, and these, along with the observations of Hammar at later age periods, are of considerable medico-legal importance in connection with the condition known as status lymphaticus and so-called "thymus death."

The Benzidin Test for Blood in Medico-Legal Cases.—*Deutsche. med. Wochenschr.*, 1908, No. 53.

Ascarelli has investigated the efficacy of the benzidin test, recommended by Adler and others, for clinical purposes, as a means of detecting blood in medico-legal cases. He used a solution of benzidin in absolute alcohol with the addition of 3 per cent. hydrogen peroxide and glacial acetic acid. On adding this solution to blood, a deep to light blue colour is at once developed, depending on the amount of blood present. The test showed itself to be very delicate, and gave a

positive reaction with a blood dilution of 1 in 300,000. Old blood-stains also gave positive reactions. The test is negative with urine, milk, seminal fluid, sputum and pus, and it can therefore be recommended as a very delicate indication of the presence of minute traces of blood.

A Contribution to the Medico-Legal Value of the Precipitin Test.—*Journal of Medical Research*, 1908, xviii. p. 218.

Gay records a case in which he employed the precipitin reaction in the detection of poaching. On the house of a suspected poacher being searched nothing incriminating was found except the mutilated heart of some large animal. He stated that the heart was that of a calf which he had bought in the market. An extract of the heart muscle gave a positive reaction with deer antiserum, whereas control experiments with calf and ox antisera were negative. The heart was thus proved to belong to a deer.

A New Method for the Detection of Seminal Stains on Linen.—*Annales de la Soc. de Méd. lég. de Belgique*, 1908.

Corin and Stockis recommend the following process for the examination of suspected stains and for facilitating the discovery of spermatozoa:—

They use a solution of erythrozin (tetra-iod-fluorescin), and in order to prevent staining of the fabric itself an ammoniacal solution (erythrozin 0·5, ammon. chlor. liq. 100) should be employed. Over-staining can be prevented by careful washing or by means of acetic acid.

Their conclusions are as follows:—The proof of the presence of semen depends on the finding of spermatozoa; the microchemical reactions of Florence and Barberio are not reliable. The maceration and application of pressure to stained fabrics results as a rule in mutilation of the spermatozoa present. It is much better, although very laborious, to tease out the fabric and carefully submit each fibre separately to examination.

Spermatozoa treated according to the author's method are rendered distinct, owing to their cherry-red colour. Microphotographs of them can be obtained by the employment of a green glass light filter. Fresh spermatozoa take on the stain better than dried specimens, and the staining is also better when the suspected stain has first of all been fixed in Müller's fluid. The age of a stain does not appear to have any detrimental effect, and in one case a stain ten months old showed spermatozoa as well preserved as in a fresh stain.

Ammonia prevents not only the staining of the linen but also acts in the same way as regards silk, wool, and cotton fabrics.

The method is also useful in the examination of other nucleated

animal cells, such as in vaginal secretion, urine, sputum, blood, &c. Starch granules, fat globules, mould spores and yeast cells do not take on the stain.

The method is especially adapted for the detection of stains distributed over a large extent of surface. The suspected fabric is dipped for a few seconds in an ammoniacal erythrozin solution, when any seminal stains present will be at once recognised by their more or less red colour in comparison with the slight tingeing of the fabric generally. Rehberg (*Ärzt. sachverständigen Zeitung*, No. 7, 1909) has subjected the test to further investigation, and fully confirms the claims made for it by Corin and Stockis. He finds that the test is exceedingly simple, takes little time, and is not only useful as a preliminary test to pick out of many stains those which will reward with success the search for spermatozoa, but also that it is reliable as a means of facilitating the detection of spermatozoa when they are present only in small numbers and in old stains.

FATAL POISONING BY SUB-NITRATE OF BISMUTH.—*Berlin. klin. Wochenschr.*, No. 39, 1908.

Several cases of poisoning by this substance have been recorded, especially amongst children.

The present case refers to a man, forty-four years of age, who at 5 P.M. received an injection into the rectum of four tablespoonfuls of bismuth sub-nitrate in two spoonfuls of water, for the purpose of radiographic examination.

Immediately after the examination, which only lasted a few minutes, the injection was evacuated along with a spontaneous movement of the bowels and the bowel was afterwards washed out.

During the night the patient was restless, and at half-past four o'clock in the morning the nurse noticed a peculiar greyish-green colour of the skin and deep cyanosis of the mucous membranes. There was a rigor, temperature 40°C., and the breathing was stertorous. At half-past five o'clock venesection was performed, and the blood was noticed to be of a chocolate colour, evidently due to the presence of meth-hæmoglobin. Death occurred at half-past twelve on the same day. On examining the blood in the afternoon the brown colour had disappeared and at the post-mortem examination, held two days after death, no meth-hæmoglobin could be detected.

The authors Nowak and Gütig made experiments on animals and were able to produce similar symptoms in cats with the drug, although they failed with dogs and rabbits. They found that the meth-hæmoglobin tended to disappear quickly after death—a fact of importance in connection with post-mortem examinations in such cases.

THE DETECTION OF BLOOD BY THE PRODUCTION OF HÆMOCHROMOGEN AND ITS CRYSTALS.—*Ärzt. sachverständigen Zeitung*, No. 7, 1909.

Kürbitz, in investigating the test first put forward by Lecha-Marzo in 1907, found that it was not necessary for the production of the crystals, which Lecha-Marzo regarded as iod-hæmatin crystals, to add a solution of iodine (chlorine, bromine), and that similar crystals were produced with blood on the addition simply of the other two solutions forming the test, namely, pyridin and ammonium sulphide.

Kürbitz proves that the crystals formed on the addition of these two solutions are hæmochromogen crystals, which are rhombic in form and of a pale rose colour, although sometimes needle-shaped and of a deeper colour.

He finds that these crystals constantly form when fluid or dried blood is treated with pyridin and ammonium sulphide, and that we thus have a test of considerable value in the detection of blood. In his opinion it is superior to Teichmann's well-known hæmin crystal test, in as much as the disturbing influences of heat, rust, hydrogen, peroxide, &c., do not interfere with its success.

DISEASES OF THE EAR.

By R. M'KENZIE JOHNSTON, M.D., F.R.C.S.,
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and
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OTITIC MENINGITIS.

THESE intra-cranial complications of suppurative otitis media may be classified as follows:—I. Pachymeningitis externa (extra-dural abscess); II. Interdural abscess; III. Pachymeningitis interna (intra-dural abscess); IV. Leptomeningitis (arachnitis). This last form may be further subdivided into—A. Benign serous leptomeningitis; B. Purulent leptomeningitis (which may be (i.) circumscribed, and (ii.) diffuse); C. Malignant serous leptomeningitis; and D. Tubercular meningitis in cases of tubercle of temporal bone. Our knowledge of the different forms of meningitis has been greatly advanced by Körner,[1] whose work has, on the whole, been followed in this abstract. Although extra-dural abscess is the most frequent of all the intra-cranial complications of suppurative otitis media, it is impossible within the prescribed limits to deal with pachymeningitis.

IV. *Leptomeningitis* (*Arachnitis*)—A. *Benign Serous Leptomeningitis.*—Levi,[2] following Quincke, has proved that serous meningitis occurs in cases of otitis media suppurativa and caries of the temporal bone, just

as serous pleurisy occurs in caries of the ribs, or œdema surrounds a furuncle (Merkens[3]); in such cases the œdematous fluid is usually sterile. Seventy-five per cent. of cases of benign serous meningitis occur under twenty-five years of age. As an example of the condition, we may take a case of extra-dural abscess, which from time to time gives rise to a collateral œdema of the soft membranes, accompanied by severe meningitic symptoms. As a rule, if the circumscribed purulent focus be not removed by operation, it finally breaks into the pial network, and sets up a diffuse purulent leptomeningitis. According to Ballance,[4] the symptoms of benign serous leptomeningitis are fever, headache, drowsiness, slow pulse and vomiting; optic neuritis is usually present, and on lumbar puncture clear fluid escapes under considerable pressure. Körner gives a list of seventeen cases, all of which resulted in recovery: the absence of autopsy in this condition leaves it doubtful if we have to deal with meningitis only, or, as Körner and Manasse[5] believe, with a serous meningo-encephalitis. Merkens calls attention to the fact that the brain membranes are very sensitive to toxins (*e.g.* pneumonia), and that in purulent ear disease we have a toxin focus close to these structures; he believes that the condition is due to toxic poisoning, and not to the presence of organisms of low virulence. Just as in otitis media, the acute serous inflammation may develop into a purulent one—the serous effusion being made cloudy by admixture of leucocytes, and, by further addition, becoming purulent (Grossmann[6]). So long, however, as pus formation has not occurred, the inflammatory condition may subside quickly and completely, for it is well known that in children acute suppurative otitis media may give rise to sopor, contracted pupils, delirium, &c., and yet in such cases paracentesis of the tympanic membrane alone may bring about complete recovery within a very short time. Benign serous meningitis may also occur after the mastoid operation. Grossmann sums up as follows:—"Serous and purulent meningitis cannot be differentiated by the clinical symptoms, but, if lumbar puncture yields a clear fluid free from bacteria but under great pressure, there is a possibility of serous meningitis: it is, however, possible that there may be somewhere a circumscribed purulent leptomeningitis. In many cases the removal of diseased bone and exposure of the affected dura mater will cause the symptoms to clear up, but, if not, we must consider the question of incising the dura and arachnoid. Heine is not in favour of too early incision, as secondary infection of the subarachnoid space is not altogether to be excluded."

B. *Purulent Meningitis* (i.) *Circumscribed.*—According to Gradenigo[7] this condition presents the following triad of symptoms:—Acute middle ear inflammation, pain in the temporal and occipital regions, and paralysis of one or both abducens nerves, without, as a rule, participation of the other cranial nerves. Of late, however, Gradenigo

has put forward the view that the paralysis of the sixth nerve may be due to pachymeningitis at the tip of the petrous bone (space of Dorello), due to disease of the air cells near the Eustachian tube. Engelhardt[8] has recorded a case of right abducens paralysis in which cholesteatoma was found along with destruction of part of the labyrinth. On the day following operation the patient was found to be stuporose; there was rigidity of the neck, retraction of the abdomen, severe headache, contracted pupils, and tense irregular pulse; but Kernig's sign was absent. There was no rise of temperature, but double abducens paralysis developed along with paresis of the right internal rectus. The patient rapidly improved, but right abducens paresis was still present three months later. It is noteworthy that lumbar puncture was not carried out, as Engelhardt believes that there is much to be said for the old view of Stadelmann that lumbar puncture may cause a local meningitis to become generalised. Alexander[9] states that sinus phlebitis, labyrinth suppuration, and extra-dural abscess are frequently complicated by meningitis, but that, as a rule, the meningitis is localised in such cases, and shows little tendency to spread.

B. (ii.) *Diffuse Purulent Leptomeningitis.*—This condition frequently complicates lateral sinus phlebitis, brain abscess, or extra-dural abscess; the uncomplicated variety is rarer than abscess or phlebitis. Thus, according to Hegener,[10] sinus thrombosis was found in 48 cases, abscess in 24, and uncomplicated meningitis in only 4 cases. Körner states that infection may spread by direct continuity from the diseased bone to the membranes, or by way of the labyrinth or facial nerve canal. If the process starts in the roof of the tympanic cavity or antrum it spreads first to the under surface of the temporo-spheroidal lobe, but if due to labyrinthitis, the meningitis begins in the posterior fossa of the same side, and spreads to the spinal canal and to the other half of the cerebellum, and only later to the cerebrum. Hinsberg[11] has noted 198 cases of labyrinth suppuration, with 104 deaths; 60 of these were due to leptomeningitis.

Symptoms.—According to Ballance, there may be an initial rigor, but the more or less *constant* symptoms are agonising headache, high and continued fever, pulse at first, slow—later, rapid and irregular—vomiting, rigidity of neck, delirium (which may occur early), and finally coma. Consciousness may not be affected till near the end. Other symptoms *frequently* present are Kernig's sign (which shows that the spinal meninges are involved), optic neuritis, squint, facial palsy, spasm or paralysis of limbs, and herpes labialis. According to Körner, the temperature in less severe cases is not characteristic, and in protracted cases may be normal or subnormal; the headache may be localised or general; optic neuritis is rare in uncomplicated cases of diffuse purulent meningitis. Körner further calls attention to the fact that the symptoms are first irritative and later paralytic, and that they depend on the location of the disease

—rigidity of the neck being absent in cases confined to the cerebrum. Stuart Low [12] states that the symptoms of meningitis may entirely mask those of cerebral and cerebellar abscess.

Diagnosis is easy in severe cases, but in the slower forms it is often impossible at first. Körner states that the condition of the ear is of no great assistance, as purulent meningitis may arise in cases where the otitis is only of the serous type. Kernig's sign is in favour of meningitis, but may occur in other intra-cranial diseases, and may be absent in meningitis. The diagnosis of tubercular meningitis can only be made by seeing tubercules in the choroid or by finding the bacilli in the cerebro-spinal fluid ; epidemic meningitis is recognised by the occurrence of other cases and by the characteristic organism. From extra-dural and intra-dural abscess the diagnosis may only be made at operation. In regard to lumbar puncture, Körner states that if the fluid be purulent and contain bacteria, we have in the great majority of cases to deal with a diffuse purulent leptomeningitis, whereas, if the fluid be slightly cloudy and contain organisms, the meningitis may be diffuse or localised. Brieger [13] has, however, reported a case in which these conditions were present, and yet only a brain abscess was found at autopsy with fistula leading into the ventricle ; no apparent meningitis. Similar cases are reported by others.

If the fluid is clear and free from leucocytes and bacteria, there is no meningitis, or only a localised form, although we must remember that, if the communication between the basal and spinal subarachnoid spaces be closed, we cannot obtain any fluid from the cranium. Ballance states that excess of lymphocytes points to a slow or subsiding inflammatory process, whereas large numbers of polymorphs indicate an active and intense inflammation. Alexander states that increased pressure is a certain sign of meningitis, and that spontaneous coagulation of the fluid is of importance ; further, that a purulent fluid may be obtained in cases of brain abscess, labyrinthitis and sinus thrombosis. According to this writer, the general condition of the patient (coma, paralysis, &c.) must form the contra-indication to operation, and not a mere turbidity of the lumbar puncture fluid. Körner states that a "dry tap" is not against meningitis, as it is usually due to missing the spinal canal, to a blunt needle, or to a plastic exudate. The danger of lumbar puncture is not great, especially if we only remove enough fluid for microscopic and bacteriological examination.

Treatment.—Körner states that the first stage of purulent meningitis is curable ; a considerable number of cases are on record in which there were well-developed symptoms of meningitis (along with leucocytes and bacteria in the cerebro-spinal fluid), and yet recovery took place after operative removal of the purulent focus in the temporal bone and intra-cranial region, combined with repeated lumbar puncture [Gradenigo, Jakins,[14] Grossmann, Dench [15]]. Körner insists that these cases should

be spoken of as the first stage (*Vorstufe*) of meningitis, and holds that if staphylo- or diplococci or B. coli be present, this stage may exist for a long time, but in streptococcal cases the prognosis is very bad, and it is "no error not to operate." The recorded cases of cure of streptococcal leptomeningitis Körner regards as doubtful. Alexander[16] has recently reported three recoveries of meningitis complicating labyrinth suppuration. After the radical mastoid operation the semicircular canals were removed and the cochlea curetted out, the dura of the posterior fossa was freely exposed, opened by a crucial incision and drained; in one case the cerebro-spinal fluid contained Gram + cocci in chains! The prognosis in these labyrinthine cases is, according to Alexander, more favourable than in other kinds of meningitis. Merkens states that it is not necessary to incise the dura, as the removal of the bone disease is sufficient. West and Scott[17] have recorded a case of meningitis following operation on the labyrinth in which cure resulted after draining the subdural space through the internal auditory meatus combined with continuous lumbar drainage (48 hours); no organisms were discovered in the fluid in this case. Scott[18] believes that even streptococcal cases may be cured by operation, though subdural irrigation (Richards[19]), extensive resection of the skull (Gluck), and laminectomy (Friedrich[20]) have all failed to bring about this result; drainage of the lateral ventricles has also proved unsuccessful.

C. *Malignant Serous Leptomeningitis.*—In this form death occurs in a few hours, and at the post-mortem no pus is found, although the subarachnoid space is full of clear serous fluid. Barr[21] says that the toxin present is so virulent as to inhibit pus formation.

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NEW BOOKS AND NEW EDITIONS.

The Collected Papers of Joseph, Baron Lister. In Two Volumes. Demy 4to, Illustrated. Price £2, 2s. Oxford: At the Clarendon Press.

THE average young practitioner of to-day hails Lister as the founder of modern surgery, and as the inventor of the catgut ligature. He is to some extent aware of the enormous debt of gratitude which we owe to him who purged our hospitals of blood-poisoning and who freed our wounds from pain. He knows that to Lister we owe the transformation of surgical uncertainty and danger to certainty and safety. He rightly dates the recent marvellous awakening and development of surgical activity from Lister's enunciation of the principles of wound treatment.

Few, however, have had an opportunity of tracing the evolution of modern methods from their beginnings, and few, indeed, realise that the principles which dominate our surgical procedures are practically already laid down in the earliest of Lister's papers.

We therefore congratulate ourselves that the most fitting of the world-wide tributes paid to Lister on his eightieth birthday was the collection of his papers, the publication of which we now welcome. The *ipsissima verba* of the illustrious surgeon have been presented to the profession, and the practitioner is afforded a full opportunity of appreciating the scientific and literary activity of the earnest life which produced the antiseptic system.

In these charming papers we can enjoy the pleasure of following the workings of a great mind concentrated upon an eager search after truth, loving science for its own sake. The first volume is largely occupied with anatomical, physiological and pathological investigations of singular originality and beauty. The classic articles upon the Parts of the Nervous System which regulate the Contraction of the Arteries; on the Cutaneous Pigmentary System of the Frog; on the Coagulation of the Blood; on the Early Stages of Inflammation, contain far-reaching discoveries and observations upon the function of the nervous system and on the vitality of the tissues. Such papers lead on to the series of studies upon the Germ Theory of Putrefaction; on the Nature of Fermentation; on the Bacterium Lactis; and on the Relation of Micro-organisms to Disease. One is astonished at the multitude of facts established, and by the direct bearing which all the researches have upon medical science. We may note, amongst many points of deep interest, the methods by which Lister contrived to isolate different

microbes, his use of heat as a sterilising agent (1871), and his discovery that the natural fluids of the body are sterile.

The second volume is chiefly concerned with the instructive history of the antiseptic system, and we recognise what has been characterised as Lister's "divine discontent," striving after perfection in the various methods which he devised. We read of the associated prepared silk and the catgut ligatures, discoveries which in themselves revolutionised the treatment and behaviour of wounds and of injured blood-vessels. We also learn how thoroughly Lister was convinced of the truth of the antiseptic theory, so that he was at once led to adopt the most daring surgical procedures, trusting absolutely to the principles he had established. We find him already, thanks to the methods he had then contrived, cutting down upon and successfully wiring the neck of the femur in a case of simple ununited fracture (1868). He fearlessly treats simple fracture of the olecranon and of the patella in a similar fashion. In defiance to all former custom, he incised, explored and drained joints, and was the first to sew up a wounded vein.

Amongst the more direct contributions to practical surgery in these volumes we may allude to the papers upon bloodless surgery, upon excision of the wrist, and the valuable articles upon Anæsthetics and Amputation which originally appeared in Holmes's *System of Surgery*.

One must regret that Lister regarded his surgical achievements largely as a matter of course, consequent upon the exact application of the views he promulgated; hence the vast amount of original work he accomplished in regard to the radical cure of hernia, supra-pubic lithotomy, extensive operations for mammary carcinoma, suture of ruptured muscles, &c., is not here recorded, since it was modestly delivered in the form of clinical lectures, and not published.

The two excellent portraits fail to convey the sympathetic expression of which Henley wrote—

> "His wise, rare smile is sweet with certainties,
> And seems in all his patients to compel
> Such love and faith as failure cannot quell."

The volumes will impress the reader and fill him with admiration for the character of the gifted author. They will serve as a monument, were any required, of one of the greatest names and benefactors that adorn the most illustrious period of the Victorian age.

Selections from the Writings, Medical and Neurological, of Sir William Broadbent, K.C.V.O. Edited by Walter Broadbent, M.D., M.R.C.P. London. 1908.

Although Sir William Broadbent was universally recognised as a physician of ripe experience in every department of Medicine, it is

doubtful if many grasped the orbicularity of his professional interests. Probably even those who knew him best have, until now, failed to realise what enormous contributions were made to contemporary Medicine by him during the period of his activity, which embraced well-nigh half a century.

We heartily welcome the present volume, which has been arranged by the pious efforts of his son, and rejoice that these scattered papers, every one of which is of real importance, and many of high value, should have been thus rendered accessible to all.

Undoubtedly the papers and addresses upon the circulatory and nervous systems are those to which the reader will instinctively turn. The contribution entitled, "An Attempt to remove the Difficulties attending the Application of Dr. Carpenter's Theory of the Sensori-Motor Ganglia to the Common Form of Hemiplegia" has long been historic, and will remain in all time a monument to the clinical acumen and scientific insight of the author. "Broadbent's theory," as it has long been known, is thus stated by the author in the communication just referred to: "*The hypothesis* suggested by these considerations is, *that where the muscles of the corresponding parts on opposite sides of the body constantly act in concert, and act independently, either not at all, or with difficulty, the nerve-nuclei of these muscles are so connected by commissural fibres as to be* pro tanto *a single nucleus. This combined nucleus will have a set of fibres from each corpus striatum, and will usually be called into action by both, but it will be capable of being excited by either singly, more or less completely according as the commissural connexion between the two halves is more or less perfect.*" Although we have travelled a long way in the development of our knowledge of the nervous system since 1866, and our nomenclature has accordingly undergone some changes, yet the theory—or as the author modestly termed it hypothesis—which he suggested is as valid now as then. The "Theory of Construction of the Nervous System," which was delivered at the West Riding Asylum, Wakefield, in 1876, is remarkable for its profundity and lucidity; it consists in a thorough exposition of the functions of the different parts of the nervous system, and embodies a full description of what was then known in regard to the subject. Along with these papers on the nervous system are a number of most interesting contributions, amongst which that on "Lateral Deviation of the Eyes," "Affections of Speech" and "Ingravescent Apoplexy" may be mentioned as full of importance.

When we turn to the scattered papers of Sir William Broadbent upon affections of the circulation, we do not find in this volume such an imposing array of contributions, but it is to be remembered that a large amount of his work in this domain has already appeared in the two valuable works on the Pulse and on Heart Disease. We have, however, quite enough in the papers upon these subjects contained in the present

volume to have made a reputation for any one man. The contribution upon the "Examination of the Heart," which made its appearance a few months before its author's death, has in consequence of that sad association a pathetic significance for all his friends. The papers on the "Conduct of the Heart in the Face of Difficulties," on "Adherent Pericardium," and on "Angina Pectoris" are characterised by scientific value and practical importance. The remarks on the "Treatment of Angina Pectoris" in the paper just mentioned may be recommended with the most perfect confidence. A contribution embodying Sir William Broadbent's ripe experience is that on the "Clinical Significance and Therapeutic Indications of Variations in the Blood-Pressure." In this are included two addresses, one to the Annual Meeting of the British Medical Association at Edinburgh in 1898, the other at the meeting of the same body in Toronto during 1906. Although the present writer was brought into sharp antagonism with the author in regard to one or two minor details, it is now a sincere pleasure to express the opinion that this contribution to the subject of arterial pressure is extremely valuable.

The volume has been heartily welcomed on every hand, not only as a record of the life-work of an eminent physician, but also as a storehouse of original observation. Dr. Walter Broadbent deserves the warm thanks of all who are interested in the progress of Medicine for the labour of love which he has filially undertaken and successfully accomplished.

A System of Medicine. Edited by Sir Clifford Allbutt, M.D., LL.D., and Humphry Davy Rolleston, M.D., F.R.C.P. Vol. IV. Part I. Pp. 764. London: Macmillan & Co., Ltd. 1908. Price 25s. nett.

When Clifford Allbutt's *System of Medicine* appeared in its first edition in 1897, it easily took first place as an authoritative expression of the current views of medical science at that time. The System included eight large volumes, and the individual articles were left in the hands of those most competent to write on them. The popularity of the book was assured, and now a second edition is being published.

The science of medicine has advanced greatly in recent years, and Sir Clifford Allbutt, and his co-editor Dr. Rolleston, have found it necessary to divide some of the original volumes into two parts.

Volume ii. embraces part i., which includes the infectious diseases (continued from volume i.) and the intoxications, and also part ii., which includes tropical diseases and diseases produced by animal parasites.

The fourth volume, which originally included a condensed account

of the diseases of the nose, pharynx and larynx, has been divided into two parts—in part i. (the volume which is at present under review) there is included the diseases of the liver, pancreas, ductless glands and kidneys, while in part ii. reviewed below there is a very complete work on the diseases of the nose, pharynx, larynx and ear.

In the present volume all the diseases therein described are dealt with in a complete and up-to-date manner, and all the more recent theories and views are discussed. Dr. William Hunter has written a new article on "Delayed Chloroform Poisoning," Dr. Morlay Fletcher has written a new article on "Biliary Cirrhosis," while Dr. Bosanquet and Dr. Newton Pitt have written many new articles on "Diseases of the Pancreas," and have embodied in these their recent researches on this subject.

In the light of modern research, almost completely fresh articles have been written by Dr. Murray and Dr. Hector MacKenzie on the "Diseases of the Thyroid Gland," while Professor Trevelyan and Dr. John Thomson write lucid articles on "Acromegaly" and "Status Lymphaticus" respectively. An article on "Œdema" has been added by Professor Halliburton, who, from his profound knowledge of physiological chemistry, has been able to put into practical form much that before was difficult to understand. The other writers of this excellent volume include the well-known names of Drs. Rose Bradford, Keith, Spriggs, Herringham, Hale White, Mayo Robson, Hawkins, Dyce Duckworth, Macalister, Rolleston and Sir. Henry Morris.

The editors have to be congratulated on bringing before the profession a volume which bears comparison with any other on the subjects in which it deals. Each article has a full bibliography attached, which makes the volume an almost necessary adjunct to the bookshelf of any physician who desires a quick means of reference on the particular subject in which he is interested.

Ditto. Ditto. Part II. Diseases of the Nose, Pharynx, Larynx and Ear. 61 Illustrations. Pp. 554. London: Macmillan & Co., Ltd. 1908. Price 25s. nett.

THIS handbook is composed of a series of articles by various authors whose names have become known for their work in one or more branches of the specialty. The advantages of such a system are great and obvious, but there is a certain tendency to inequality and overlapping. At the end of each section there is a list of references to the literature of the subject dealt with. The first part of the work, which deals with diseases of the nose, is hardly up to the standard of the rest of the book, though the articles by Mr. Waggett on the "Nasal Septum" and that by Sir Felix Semon and Dr. Watson Williams on

"Nasal Neuroses" are excellent: in the latter the writers strike a happy medium between the "nasal reflex" enthusiasts, such as Francis, and the "scoffers." "Suppuration in the Accessory Sinuses" is shortly and lucidly described by Mr. Tilley, but there is nothing new or striking in the article. The vexed question of "adenoids" is well dealt with by Semon and Williams—the advice given as to the indications for operation being specially good; the same writers draw attention to the importance of the supra-tonsillar fossa in connection with recurring attacks of peritonsillitis, but do not describe the most efficient of all operations—enucleation of the tonsil. Semon's well-known views as to the essential identity of septic pharyngitis, laryngitis, erysipelas of the pharynx and angina Ludovici are well stated, but rather too much attention is paid to scleroma—a disease that many specialists in this country have never seen. The section on the larynx—also by Semon and Williams—is beyond all praise and certainly beyond criticism: the authors have rightly introduced only coloured plates of diseases of the larynx. The chapters on tubercle, syphilis and malignant disease are specially good, and, in regard to the latter, the authors point out the importance of a diagnosis being made early enough for thyrotomy to give good results, and the objections to extirpation of the larynx are fully and clearly stated. Mr. Wagget's article on "Direct Laryngoscopy and Bronchoscopy" is complicated by the description of too many instruments and modifications, and diseases of the trachea are somewhat too fully dealt with by Sir Felix Semon. In the last part of the volume, dealing with diseases of the ear, nearly every article is by a different writer, and the tendency to overlapping is most marked. Dr. Barr's article might well have given a fuller account of the examination of the vestibular apparatus and of Bárány's work on this subject. The short chapter on general therapeutics by Dr. Porter is eminently sound and practical. Mr. Hunter Todd writes at considerable length on the external ear and tympanic membrane. Dr. Dundas Grant's article on "Acute Inflammation of the Middle Ear" is marked by sound views on the pathology of the subject: he points out that the catarrhal process cannot be strictly defined from the suppurative, and that the limitation of inflammation to one section of the middle ear cleft is theoretically almost impossible. Chronic suppuration is well described by Mr. Milligan, and the intra-cranial complications of middle ear suppuration are ably dealt with by Mr. Ballance, while eustachian obstruction and chronic middle ear catarrh are clearly explained by Mr. Cresswell Baber. In conclusion, attention must be drawn to the really excellent article by Dr. M'Bride on "Affections of the Labyrinth"—the classification adopted being much in advance of that appearing in other text-books. Sir Felix Semon and Dr. M'Bride richly deserve the tribute paid to them by the Editors in the preface of this volume.

The Practice of Medicine. By the late M. CHARTERIS, M.D. Ninth Edition. Edited by F. J. CHARTERIS, M.D. Pp. 689. London: J. & A. Churchill. Price 10s.

IN the ninth edition of this popular manual extensive alterations have been made to bring the book up to date.

Thus the articles on several of the acute infectious diseases and on blood diseases have been rewritten. Great changes have been made in the parts dealing with nervous diseases in order to include the most recent knowledge and methods of examination on these diseases; and several morbid conditions that have attracted special notice recently, such as mucous colitis, duodenal ulcer, heart-block, and fibrositis are introduced for the first time.

A special feature of this text-book is to be found in the appendix of 90 pages, which contains a therapeutical index, a description of the more common incompatibilities, a glossary of medical terms, and a method of performing post-mortem examinations. The therapeutical index has many prescriptions, and appears to be eminently practical.

Generally the book is extremely clear and concise, and the attention paid to each article is carefully balanced with its intrinsic importance. In one or two cases, however, new subjects receive more attention than they deserve; for example "fibrositis" has more space allotted to it than lead-poisoning.

The nomenclature of skin diseases has always been rather a barbarous thing, but more deference might be paid to gender than to allow "impetigo contagiosa" and "impetigo herpetiforme" to occur on two succeeding lines of p. 568. This is, however, the only error we have noted in a carefully written book.

For students who wish to obtain a concise text-book, for general practitioners desirous of having a practical manual of treatment, or for nurses requiring a volume that gives a clear and interesting description of disease, we know of no better book at the price.

A Manual of Clinical Diagnosis. By JAMES CAMPBELL TODD, M.D. Pp. 319. W. B. Saunders Co. 1908. Price 10s.

THIS book, which is neatly bound in leather, adds another to the already long list of books written on this subject. It is written for students and general practitioners, and gives a very concise account of the more important laboratory methods which are used as an aid to clinical diagnosis. The methods of examination of the sputum, urine, fæces, stomach contents and blood are described in an eminently practical manner. There are also sections devoted to animal parasites and special methods, *e.g.* cytodiagnosis, and the examination of the cerebro-spinal fluid, &c. It is very well illustrated, both with single-

tone and coloured illustrations, which are without exception good, and from a study of these alone a great deal can be learned. It is up to date, and can be recommended as a text-book for students and a reference book for the busy practitioner.

Pulmonary Tuberculosis and its Complications, with Special Reference to Diagnosis and Treatment: for General Practitioners and Students. By SHERMAN G. BONNEY, A.M., M.D., Professor of Medicine, Denver and Gross College of Medicine, Medical Department of the University of Denver, &c. Pp. 778. With 189 Original Illustrations, including 20 in Colour, and 60 X-ray Photographs. Philadelphia and London: W. B. Saunders Co. 1908. Price 30s.

THIS is a comprehensive and elaborate treatise, not only on pulmonary tuberculosis, but on tuberculous manifestations in almost every organ and tissue, as these may show themselves as complications of the lung disease.

The subject occupies no fewer than 100 chapters. The general arrangement is simple and natural. After a slight historical sketch, the tubercle bacillus is discussed at some length. The present-day position as to the relationship of human and bovine tubercle bacilli is reviewed with fairness, and the growing consensus of opinion clearly stated to the effect that, while recognisable differences exist between human and bovine bacilli in respect of morphological and cultural characters, these are not of such a nature as to establish a *fundamental* difference. The differences may be accounted for by modifications undergone in various hosts. The pathogenic virulence of the bovine form is greater among animals than that of the human bacillus. In man, the human bacillus has greater pathogenic value than the bovine. None the less, the practical dangers of infection by the bovine bacillus are sufficient to justify preventive measures against the disease as it appears among cattle.

The channels of infection are discussed in fair and judicial spirit. The view taken is that the predominance formerly given to the respiratory tract as the principal route of bacillary invasion must be considerably modified, and that both the respiratory and the digestive tract are to be looked on equally as available channels of infection.

The distribution of tubercle bacilli, the influence of race and of geographical position, are considered at some length. Thereafter follows an account of the pathological anatomy, both microscopic and macroscopic.

The remaining eighty-five chapters are occupied with the symptomatology, clinical features (including complications), and treatment of pulmonary tuberculosis. In the main, this has been overtaken well.

It might have been better to devote a larger proportion of space to the more detailed discussion of pulmonary tuberculosis as such, and have correspondingly limited consideration of complications. It might have been well to commence the clinical consideration with a chapter dwelling on the constitutional nature of the affection. There is considerable need that the constitutional, as opposed to the local, nature of the disease should be emphasised. In a large proportion of instances, symptoms of constitutional disturbance present themselves long before such symptoms as cough, expectoration, dyspnœa, etc., which are more especially referable to the local lesion.

The termination and causes of death are rather scantily discussed. There is little, if any, allusion to the significance of the toxins formed by the tubercle bacillus *in vivo*, and their presence as a chief cause of an advancing intoxication.

Physical signs are discussed at considerable length, and, in the main, in practical and satisfactory fashion. Here too, however, space for a fuller explanation of their significance in relation to varying stages of disease might have been advantageously found by the omission of illustrated paragraphs on stethoscopes and the like. The significance of minor degrees of percussion change is rather lightly considered, and there is no reference to "tidal" percussion.

Treatment occupies the last 200 pages. Of this, some 50 pages are given up to prophylaxis, including a discussion of the reciprocal relations of consumptives and society, compulsory notification, the supervision and education of consumptives, the various institutions desirable in an organised campaign, the education of the general public, and administrative control. In this connection, the separate value of the tuberculosis dispensary, the sanatorium and the hospital for advanced cases, is satisfactorily stated. The relationship of the dispensary to the great mass of the tuberculous poor is explained, and the extreme importance of the system of domiciliary visitation, first instituted in Edinburgh, is emphasised.

The report of the author's personal observations on the use of bacterial vaccines is interesting, and a number of good points are made. His experience might usefully have been collated with the work of others, and more definite directions been given as to the use of the various forms of tuberculin and the principles of dosage.

Altogether, the work is an important contribution to the literature which bears directly on the care and treatment of pulmonary tuberculosis. It is well got-up and readable, if, perhaps, physically, the volume is rather weighty to hold in one's hand. Incidentally, a mild deprecation of this tendency on the part of modern publishers to produce *heavy* volumes may be allowed.

Epoch-Making Contributions to Medicine, Surgery, and the Allied Sciences: Being Reprints of those Communications which first Conveyed Epoch-Making Observations to the Scientific World, together with Biographical Sketches of the Observers. Collected by C. N. B. Camac, A.B., M.D. With Portraits. Pp. 435. Philadelphia and London: W. B. Saunders Co. 1909.

This work neither suggests or deserves criticism except, possibly, as to the selection of epoch-making papers. Without any chronological sequence these original articles are put together in a handsome volume. Lister's original monograph on the antiseptic system—with the putty—is followed by Harvey on the circulation of the blood. Avenbrugger and Laenac are followed by Jenner. Morton on "Anæsthesia" and Holmes on "Puerperal Fever" conclude the volume. The paper on "Anæsthesia" glorifies Morton and ether at the expense of Simpson and chloroform. It is not very informing, but may be useful to those whose library is contained on one small shelf.

An Index of Treatment, by Various Writers. Edited by Robert Hutchison, M.D., F.R.C.P., and H. Stansfield Collier, F.R.C.S. Fourth Edition. Pp. 926. Bristol: John Wright & Sons, Ltd. 1909. Price 21s. nett.

The work is valuable as a book of reference for treatment of medical and surgical ailments. The names of the contributors afford a guarantee of the high value of the articles. That a fourth edition has appeared within a year of the original publication of the Index is evidence how highly it has been appreciated. The whole work has been revised, and several new articles have been added. The arrangement of subjects is alphabetical.

A Manual of Medical Treatment. By I. Burney Yeo, M.D., F.R.C.P. Fourth Edition, revised by I. Burney Yeo, M.D., F.R.C.P.; Raymond Crawfurd, M.A., M.D.(Oxon.), F.R.C.P.; and E. Farquhar Buzzard, M.A., M.D.(Oxon.), F.R.C.P. In Two Volumes. Vol. I., pp. 802; Vol. II., pp. 829. London: Cassell & Company, Ltd. 1909. Price 21s.

This useful Manual has been brought up to date, the arrangement of subjects being the same as in the 1902 edition. Each article contains such an outline of the pathology and symptoms of the disease as may form the basis for a scientific and practical discussion of treatment, or of methods of treatment. Throughout the text are numerous formulæ for remedies which are considered to be suitable. It is a distinct advantage that the general index is printed at the end of each volume.

Vaccine Therapy and the Opsonic Method of Treatment. By R. W. Allen, M.D., B.Sc. Second Edition. Pp. 244. London: H. K. Lewis. 1908. Price 7s. 6d.

This book is intended for the use of general practitioners and students. That it has reached a second edition within a year of its first appearance is ample proof of its usefulness. The methods of estimating the opsonic index and the preparation of vaccines are fully explained. Beginning with the opsonic index in health, its value as a diagnostic and prognostic agent is given, then each disease or group of diseases is taken up separately, and the opsonic index to the causal organism and the best method of treating such cases by vaccines indicated. This forms the most useful part of the book.

A good deal of space is taken up with irrelevant matter, *e.g.* the characters of Poyton and Payne's organism of rheumatic fever, a description of Pirquet's cutaneous reaction and Calmette's ophthalmo-reaction.

Throughout the book with but few exceptions the term "tubercular" is used instead of "tuberculous." But on the whole the book gives one a very fair representation of our present knowledge of opsonins and vaccine therapy. The appendix contains several useful hints, and the index at the end is a very good one and should prove useful for reference.

Text-Book of Nervous Diseases and Psychiatry. By Charles L. Dana, A.M., M.D., LL.D. Seventh Edition. Pp. xii., 782. London: J. & A. Churchill. 1909. Price 25s.

The seventh edition of Dr. Dana's text-book has been thoroughly revised and brought up to date, and is calculated to give the student or practitioner a good general idea of the present state of the science of neurology and psychiatry, without unduly burdening his mind with minutiæ. The inclusion of mental diseases in a text-book of neurology is somewhat of a novelty, but we believe it will be appreciated by most readers. Although only a hundred pages are allotted to the subject, Dr. Dana has packed a great deal of useful information into them, and the classification adopted—dementia præcox, mania and melancholia, paranoia, confusional insanity, organic and senile psychoses—is one which lends itself to clear description and definition. The revision of the chapters on Nervous Diseases has been very complete; for instance, Houston and Rankin's work on epidemic cerebro-spinal meningitis and Flexner's serum treatment are mentioned. In connection with exophthalmic goitre, Beebe's experiments on sero-therapy and Halstead's work on parathyroidectomy are alluded to. An omission which deserves to be remedied in future editions is the absence of any reference to stage-decompression in caisson disease. Under the head of Landry's

paralysis, Wickham's classification of the various forms of the so-called Heine-Medin's disease are given. It would have perhaps been better to have grouped all these under anterior poliomyelitis.

Here and there signs of hasty revision are apparent. There are not a few printer's errors, and some more serious slips. Hæmaturia is said to be common in Raynaud's disease; presumably hæmoglobinuria is intended. Under the term "spasmus nutans" a miscellaneous group of different diseases are indiscriminately gathered together. Besides spasmus nutans proper (head-nodding and nystagmus of infants), some of the conditions described by Dr. Dana are really habit spasms, tics, and other neuroses.

The text-book, however, is a reliable guide to the subjects of neurology and psychiatry.

The Medical Annual: A Year-Book of Treatment and Practitioner's Index. Pp. 756. Bristol: John Wright & Sons, Ltd.; London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd. 1909. Price 8s. 6d. nett.

THE 54 plates and 159 other figures are well executed, and add considerably to the value of the present volume, which maintains the high standard of excellence which has rendered previous volumes of so great use to the busy practitioner. The numerous references throughout the book are invaluable to those who wish to consult original articles.

Diseases of the Rectum, Anus and Sigmoid Colon. By F. SWINFORD EDWARDS, F.R.C.S. Being the Third Edition of Cooper and Edward's *Diseases of the Rectum and Anus.* Illustrated and Enlarged. Pp. 442. London: J. & A. Churchill. 1908. Price 10s. 6d.

THIS book, published sixteen years after the second edition, is to all intents and purposes a new one. As the change in the title leads us to expect, the author is a strong advocate of sigmoidoscopy, and it is interesting to find that the information gained in many cases of mucous colitis has made him "sceptical as to the 'nervous' variety of this disease." With thirty years' experience behind him, the author is well qualified, and does not hesitate to state his definite convictions in every branch of the subject. In addition, the systematic accounts are plentifully interspersed with illustrative clinical records which increase the interest of the reader. One of the most instructive sections of the book deals with fistula-in-ano, of which a valuable classification is given based on many thousands of cases treated in St. Mark's Hospital. The expedients resorted to in order to divide the sphincter only once

and not too obliquely are clearly explained in the letterpress and diagrams. For internal hæmorrhoids the author recommends Salmon's operation by ligature, and it is worthy of note that he is strongly in favour of the treatment of uncomplicated cases by the injection of acids and styptics. The chapter on the operative treatment of malignant disease of the rectum and colon is entirely new. The various methods of procedure are admirably described, and useful statistics are given of the author's trans-sacral operations. As a substitute for inguinal colotomy, he is "beginning to prefer" the hypogastric method through the left rectus sheath. The drawings, some from photographs and others from rough sketches, are exceptionally clear and easily followed.

Anatomie und Mechanismus der Skoliose. CARL NICOLADONI. Berlin: Urban & Schwarzenberg. 1909.

NICOLADONI died in 1902, before the publication of any account of his work on scoliosis. The fuller of the two descriptions of his researches which he had prepared was subsequently published in the *Bibliotheca Medica*, where it is accessible to comparatively few. The shorter account of his investigation, prepared at the same time as the other, has now been published, by his sister, in order to bring the results of his labours before a wider circle of readers. Anyone wishing to make an intimate study of scoliosis will find this book of the greatest value, for it gives a full, though concise, description of the morbid anatomy of lateral curvature, with an analysis of the mechanics of the changes produced in the individual vertebræ and the spinal column as a whole. The points brought out in the text are illustrated by a series of 37 excellent plates. It is a matter for congratulation that Nicoladoni's work has been so well produced in a convenient form.

Suture of Arteries: An Experimental Research. By E. A. SMITH, F.R.C.S. Pp. 70. London: Henry Frowde and Hodder & Stoughton. 1909. Price 2s. 6d.

THIS gives an account of an experimental research carried out by the author on animals, along with a description of the methods and results of previous investigators. The first successful operation on the human subject was performed in Newcastle-upon-Tyne in 1759 on the suggestion of Lambert, a tear in an artery being closed by means of a steel pin with a thread twisted round after the manner of a hare-lip pin. End-to-end union has been attempted in many ways. Gluck resected a piece of the vessel to slip like a cuff over the line of suture; Brieau and Jaboulay used a mattress suture so as to evert the edges and bring intima against intima; Murphy invaginated the central

into the peripheral end; and Payr employed various magnesium cylinders as aids to anastomosis. Apart from sepsis, thrombosis is the commonest accident. The author's technique develops in the course of his experiments, and he finally recommends a "quill-suture" of fine silk, a piece of chromicised gut being used for the quill, which passes through the loops of the various stitches. He gives details of his operations, with photomicrographs of the vessels at various dates after suture. It is an interesting contribution to an interesting subject.

A Text-Book of Operative Surgery. By WARREN STONE BICKHAM, Junior Surgeon, Touro Hospital, New Orleans. Third Edition, greatly Enlarged, containing 854 Illustrations.

WE extend a cordial welcome to the third edition of this well-known work. It is widely appreciated as an extremely reliable reference work in operative surgery, and we know of no one which is more up-to-date. It contains also excellent descriptions of the surgical anatomy of the different regions. The new edition is larger than the last by 220 pages, and close upon 300 new illustrations have been added.

Gunshot Wounds. By Major C. G. SPENCER, R.A.M.C. Pp. 279. Oxford Medical Publications. 1908. Price 5s.

ALTHOUGH not full enough to serve as a guide in the actual treatment of gunshot wounds, this little book will serve as a useful introduction to a general study of the subject with which it deals. Chapters on the Mechanics of Projectiles and General Characters of Gunshot Wounds are followed by others on Wounds of Special Tissues and Regions. Based as it is on the experience gained by surgeons in the South African and Russo-Japanese Wars, the teaching is up to date and appears to be thoroughly sound. The risks of attempting operative treatment in field hospitals, and the necessity of deferring it, whenever possible, till base hospitals are reached, are especially insisted on.

The Operative Treatment of Chronic Constipation. By W. ARBUTHNOT LANE, M.S., F.R.C.S. London: James Nisbet & Co., Ltd. 1909.

IN this new edition of Mr. Lane's work on *The Operative Treatment of Chronic Constipation* the author's well-known views are expounded with all the assurance and dogmatism of which he is capable. There is a great deal of wisdom and of truth underlying his argument, but, just as he has failed to convince the profession that breathing exercises

are the best cure for adenoids, and that all oblique fractures of the leg are to be subjected to operation, so he fails to carry the conviction that the proper treatment of chronic constipation is to excise the colon.

Constipation and Intestinal Obstruction. By SAMUEL GOODWIN GANT, Professor of Diseases of the Rectum and Anus in the New York Post Graduate School and Hospital. Philadelphia and London: W. B. Saunders Co. 1909.

To combine the subjects of constipation and intestinal obstruction is a new departure. They have really very little in common, except that they both affect the bowels, and that a few forms of intestinal obstruction are preceded by constipation. The author runs them together, by describing the so-called causes of deficient or delayed action of the bowels as constipation and the surgical or mechanical causes as obstipation or obstruction. We do not see how the reader is to derive any advantage from this arrangement; to the author it may serve as a justification for extending the range of his activities from diseases of the rectum and anus, of which he is a distinguished professor, to the intra-abdominal portion of the alimentary tract.

The subject-matter of the book is excellent, and the illustrations, which are very numerous, are an education in themselves. The chief value of the work, however, lies in the attention which is directed to the important subject of constipation, and especially to its treatment by means of diet, exercises, hydrotherapy, massage, mechanical vibration and electricity.

Movable Kidney. By C. W. SUCKLING, M.D., M.R.C.P. Second Edition. Pp. 155. Birmingham: Cornish Brothers. 1909. Price 5s.

THIS is the work of an enthusiast: so far, all readers will be in agreement; thereafter opinions will diverge. Most medical men regard movable kidney as in many cases an important factor, and did so regard it considerably earlier than within the three years implied in the author's sentence—"Since writing the first edition of this book I find that students are now being taught to palpate the abdomen for movable kidney, and that many practitioners are now diagnosing the condition." Most men will further agree that, where dilatation of the stomach, mucous colitis, albuminuria, gynecological diseases and the like co-exist with movable kidney, they are in a certain proportion of cases caused by it, and will then be probably cured by fixation of the kidney. The question, however, remains whether nephropexy is as certainly curative as the author asserts in the long list of ailments and

diseases which he enumerates. Its wholesale efficacy in insanity is the part of the author's thesis which few will be prepared to accept. "It is absolutely proved that where dropped kidneys are present in insane patients, nephropexy, *properly* performed, cures the insanity. If failure results, it is because the operation was faulty." This is a sweeping assertion, and inevitably means that people with dropped kidneys are exempt from the many forms of insanity which may attack people in whom the kidneys are normal, and in whom, therefore, the insanity must necessarily be due to some other cause than dropped kidney. The future will decide whether Dr. Suckling is a pioneer or is riding a hobby to death.

Operative Nursing and Technique. By C. P. CHILDE, B.A., F.R.C.S.(Eng.). Pp. 224. London: Baillière, Tindall & Cox. 1909. Price 3s. 6d.

INTENDED especially for nurses, this book may be read with advantage by the student or the house-surgeon. Its chief value lies in its definiteness. Thus in describing the course of an operation, the duties of each person in the theatre are given in their order and in their relation to what the others are doing at the same time. This avoidance of vague generalities is a very important characteristic in an elementary book. The general treatment of the patient before and after operation, the preparation of the operation area, abnormal clinical features to be noted and reported, and the treatment of complications are given with the same directness. There is an illustrated chapter on the Instruments required for Various Operations, and another on Operations in a Nursing Home and in a Private House. In the latter case, however, we question whether the nurse would as a rule be able to take with her six separate sterilised tins of dressings, &c., as described. The only other statement that invites criticism is that in which the author speaks of post-operative parotitis and mumps as identical. There is nothing new in the book, but, by omitting information on general nursing and dealing only with surgical nursing in its relation to operative surgery, a compact and useful little book has been produced.

A Theory regarding the Origin of Cancer. By C. E. GREEN. Pp. 38. William Green & Sons. 1909.

The Etiology and Nature of Cancerous and other Growths. By W. T. GIBSON, A.R.C.S. London: John Bale, Sons & Danielsson, Ltd. 1909. Pp. 124. Price 6s.

IT is very interesting to compare these two works, each by laymen, well educated and enthusiastic, on this most difficult and elusive subject.

Mr. Green has been working in a quiet and modest way for years, and though not a medical man, he has read much medicine and has had great opportunities of discussing cancer with eminent medical men. He starts with the Registrar-General's returns, which, he thinks, prove two things—(1) that cancer is common in certain trades, and uncommon in others; (2) that it is much more prevalent in some districts than in others He follows up this by reference to the tables of the Registrar-General, the same ones as are used by Mr. Gibson. He traces cancer or cancerous overgrowths in plants and animals, and finishes by the theory that lime and copper in their relations to oxygen may have a virtue in the prevention of cancer. To trace the genesis of this theory one must read carefully the little pamphlet, which contains many interesting observations on cancer houses.

Mr. Gibson's book is larger, and is piled with facts out of the Registrar-General's returns. The chapters are numerous, and their headlines instructive. Starting with local irritation as a cause of abnormal growth, he traces occupational incidence and bacterial decomposition products; mechanical traumata as causes of malignant and innocent growths. Cancer of uterus and mamma has a special chapter, but it is neither learned nor instructive. Several chapters on arsenical cancer, and the neurotic hypothesis, are not sufficiently elaborated. In the end it seems to be the root idea that cancer is due to an increased alkalinity of the blood and tissues, which can and should be neutralised by the use of certain acids, cinnamic and benzoic for choice. The book is quite a modest one, and contains a considerable amount of information on subjects connected with cancer and its origin. In the preface it is stated to be merely a preliminary statement, so we shall expect a larger work next time. The author knows his chemistry so far, and there is no trace of self-seeking or advertising about it. There is a useful index. It is interesting to see laymen working at cancer in a quite legitimate and friendly manner. In neither book is there a word reflecting on the merits or demerits of the medical profession.

The Position of Abdominal Hysterectomy in London. By J. Bland Sutton, F.R.C.S. London: James Nisbet & Co. Price 2s. 6d.

This brochure contains a great deal more of interest than the name implies.

The statistics of the enormously lessened risks from abdominal hysterectomy within the last decade in London are only in keeping with those obtained elsewhere.

We heartily endorse the author's remarks on the importance of the use of sterilised gloves and rapidity of operation, as also his preference for the subtotal to the pan operation. All who have experience in the

treatment of uterine fibromyomata must also be in accord with the views expressed on the comparative frequency of corporeal cancer with these growths, and the extreme rarity of cervical malignancy either in association with, or subsequently in, the stump of the cervix.

The necessity for hysterectomy in many cases of fibroids and pregnancy we also uphold, though that can hardly be called the "position of hysterectomy in London," according to the views of other writers there.

Many interesting cases are quoted of injuries to the uterus, and the chapter on injuries to the ureters, and their treatment, is well worth studying.

The statement that washing out the uterus after curetting is useless and dangerous, is contrary to the opinion of many experienced gynecologists, and is perhaps the only point in which we are at complete variance with the author.

The book bristles with points of practical interest and importance, and is well worth the careful perusal of those interested in obstetrics and gynecology.

Medical Gynecology. By Samuel Wyllis Bandler, M.D. With original Illustrations. Philadelphia and London: W. B. Saunders Co. 1908.

In a volume of 676 pages the author endeavours to lay before his readers the conservative treatment of the diseases of women as viewed from the standpoints of symptoms, the disease, bimanual and microscopic findings, and the general physical and nervous state.

In examination of the abdomen the author recommends the lithotomy position, which is hardly necessary or desirable in routine practice. For examination of the vagina and for its treatment Ferguson specula are absolutely essential to the author, where the use of the same is, in our opinion, comparatively limited. In describing the uterine sound no reference is made to its use as an agent for making therapeutic applications to the uterine cavity, and the illustrations of the method of use in replacing a retroverted uterus are not good. The curette finds a legitimate field for use in certain cases, but why not also in the most important of all from the diagnostic standpoint, viz. possible cancer cases? The importance of microscopic examination of uterine scrapings is overlooked in the description of the operation of curettage, and this in spite of the clinical symptoms of chorio-epithelioma detailed on page 179, where the first symptom is stated as "pronounced uterine hæmorrhage recurring even after repeated curettings." Had a microscopic examination been carried out in such a case after the first curetting, subsequent treatment would not have been "repeated

curettings." The pages dealing with associated nervous conditions met with in gynecology are the best in the book, and contain some practical and suggestive ideas.

No less than 73 pages are devoted to gonorrhœa and syphilis, and 42 pages to constipation, while displacements of the uterus receives but scant recognition in 21 pages.

The text is not free from grammatical errors, and the book is unnecessarily large. This is accounted for in some measure by deliberate and designed repetition and reiteration with the object of emphasising important points.

Chavasse's Advice to a Wife on the Management of her own Health. Fifteenth Edition. Revised by G. Drummond Robinson, M.D., B.S.(Lond.), F.R.C.P., Physician to the British Lying-in Hospital, &c. Pp. 360. London: J. & A. Churchill. 1909. Price 2s. 6d. nett.

Chavasse's Advice to a Wife still holds on its way, and has reached its 390th thousand. The young wives of to-day, like their grandmothers in their time, find advice (always sensible) and encouragement (tempered with mild reproof) blended together in a "chatty" and engaging manner, and all compacted together with frequent verselets of poetry (less or more to the point). There is a certain degree of incongruity in the association on the same page of rules for getting rid of bugs and of quotations from Pope and Byron; but we presume the young wife enjoys her medical information mixed with the poet's "thoughts that breathe and words that burn." But we must protest that the definition of a still-born infant by Tennyson on p. 277 is hardly poetry, and might be printed as prose without taking from the late laureate's fame. The medical and hygienic advice scattered throughout the volume is generally sound, although we doubt whether the young lady of the present day thinks that it is "unladylike to eat much," although her ancestor of the early Victorian period, before the advent of hockey and tennis, may have so thought.

Transactions of the American Gynecological Society. Volume XXXIII. for the year 1908. Pp. lvi., 556. Philadelphia: Wm. J. Dornan, Printer. 1908.

The annual volume of this old and famous American Society contains a long list of interesting papers on gynecological subjects. In a short presidential address, Dr. Baldy pleads in impassioned terms for salaried anæsthetists, and states that "women are being tried and are proving

most satisfactory as anæsthetists, and it will be a bright day of advance in the technique of the operating-room when their services are more generally adopted." We fancy that if this address had not been a presidential one, and on that account beyond the reach of criticism, some of the Fellows of this Society might have had some remarks to offer on Dr. Baldy's emphatic statements. An interesting series of articles on early or late operative interference in ectopic gestation constitutes a symposium on that debated subject well worthy of perusal. Dr. Whitridge Williams asks the question, "Is pubiotomy a justifiable operation?" and answers in the affirmative; but in the discussion that followed the reading of this paper there were several speakers who did not hold the same high opinion of the cutting operation, and there were some who said a word in favour of the neglected procedure of the induction of premature labour. Dr. F. H. Martin's paper on "Transplantation of Ovaries" is full of extraordinary results which may well afford food for thought.

Causation of Sex. A New Theory of Sex based on Clinical Materials, together with Chapters on the Forecasting of the Sex of the Unborn Child, and on the Determination or Production of Sex at Will. By E. Rumley Dawson, L.R.C.P., London, M.R.C.S., England, &c. With 21 Illustrations. London: H. K. Lewis. 1909.

Dr. Rumley Dawson here states and defends his theory of the causation of sex. He holds that "there being, as we have seen, two ovaries, a right and a left, it follows that the ova produced are either right or left ova; also that, as the right ovary is larger than the left, more right-sided ova are usually produced" (p. 45), and that "man or the male has nothing to do with the causation of the sex of the future child" (p. 55). He holds that "a male fœtus is due to the fertilisation of an ovum that came from the right ovary, and a female fœtus is due to the fertilisation of an ovum that came from the left ovary" (p. 46).

Dr. Dawson is not discouraged by the fact that women have borne children of both sexes after one ovary has been taken away, as in such all ovarian tissue cannot have been removed. He believes that there is alternate action of the ovaries, and thus, after the birth of one child, it is possible to forecast the sex of a future child. We need not, however, give details on this point.

In his preface the reason of this research is given in the following words:—"The problem of the causation of sex in mankind has always been a fascinating one, and only recently it has been described as on the "borderland of the insoluble." "Some hitherto insoluble questions have been solved; for example, by marconigrams, radio-

grams and submarine warships: others are being assailed, for both Arctic and Antarctic expeditions are attempting to solve the polar question, while the conquest of the air by aërial machines and dirigible balloons will not apparently be long delayed." In the last page of his work Dr. Dawson expresses the hope that "we may possibly some day, by means of some modification of the Röntgen or other rays, be able to actually see an ovary ovulate. This should not sound so improbable when we recall how impossible the location of swallowed objects, bullets, and other foreign bodies would have been thought before the discovery of the Röntgen rays." . . . "If ever this comes to pass, the solving of the problem how a Royal house would be able to avoid the birth of a princess when a prince was wanted would be rendered quite easy; it would allow even the first child to be a boy if so desired. Until the right or male ovary was seen to ovulate, sexual congress would be prohibited; then, if fertilisation followed, the desired prince would be born. There are still many houses awaiting such an event with anxiety" (p. 190).

Since Dr. Dawson has given his fancy such play, we must confess that we are disappointed he has overlooked the possibilities of the use of a modification of the submarine warship as a means of ascertaining the actual ovary ovulating. It would, of course, be a much more cumbrous adjunct even to Royalty, and probably this has determined its rejection.

Dr. Rumley Dawson is not without justifiable forebodings as to the reception by the critics of his satire of research, and he therefore fortifies himself by a dedication "To the Memory of a Medical Martyr, the late Ignatius P. Semmelweiss." Why he should have selected the great discoverer of the Contagious Nature of Puerperal Fever, and not Sprengel or Mendel—long neglected workers in fertilisation questions—or why, indeed, he should think it necessary to place on Semmelweiss's grave a dedication to the investigation of the irrelevant, is as great a mystery as his theory of the causation of sex.

Infant Feeding: A Practical Guide to the Artificial Feeding of Infants. By J. S. Fowler, M.D., F.R.C.P.(Edin.), Physician to the Royal Hospital for Sick Children, Edinburgh. Pp. 230. London: Henry Frowde and Hodder & Stoughton. 1909. Price 5s.

This book is based on courses of lectures delivered to students and graduates, and treats its important subject from a thoroughly practical point of view. While the author does not claim that it is exhaustive, it will be found to give full information as to the principles and main details concerned in the artificial feeding of babies.

The first of its six chapters deals with the importance of the

subject of hand-feeding, the composition and other properties of cow's milk, the digestive functions in infancy, and the composition of human milk.

In the second chapter are considered the practical ways in which clean and relatively sterile cow's milk may be obtained. After speaking of the difficulties which still exist in getting milk which has not been grossly contaminated before delivery, the author discusses the best means of destroying its bacterial impurities. He prefers prolonged sterilisation of the milk when expense is no object, and when the weather is hot. In cool weather, and among the poor, he regards simple boiling for 5 to 10 minutes as quite satisfactory—provided the milk is fairly fresh. The value of pasteurisation has, he thinks, been greatly exaggerated; he gives a not unnecessary warning against the idea, recently prevalent in many quarters, that the dangers of sterilisation are comparable to, if not greater than, those which are run by the use of raw milk. The size of the baby's meals is then considered; and the extent to which this should be regulated by his weight and age, his weight-curve, his appetite and the caloric value of food are dealt with—also the shape and other characters of the feeding-bottle.

The feeding of the normal infant from birth forms the subject of the third chapter. Dr. Fowler holds that dyspepsia arises practically always as the result of bad feeding. Great care and persistence are necessary, and among other things the importance of patient training of the child's stomach to deal with sufficiently nourishing forms of food is insisted on. The advantages of diluted and undiluted milk are discussed and compared.

The fourth chapter is taken up with consideration of the value and mode of action of cereal decoctions, alkaline solutions and citrate of soda as additions to the infant's bottle, with peptonised milk, modified milk, whey, buttermilk, albumin water and raw meat juice; also with the various forms of condensed milk and the proprietary foods.

The diet in abnormal cases is next considered, and the diagnosis of such cases by means of interrogation of the mother and inspection of the infant's stools. Types of wasting and dyspepsia are next described, along with their appropriate treatment.

The last chapter takes up the consideration of the diet during the second year of life, weaning and mixed feeding, the care of premature babies, forced feeding, washing out of the stomach and rectal injections.

The illustrations, which are numerous, include weight-charts of actual cases and a number of photographic representations of the effect which various modes of treating the milk have on the appearance of its curd.

Dr. Fowler's book is clearly and interestingly written, and shows an acquaintance with the most recent continental and American literature on the scientific aspects of the subject. It is inspired

throughout by common sense, and shows a pleasant absence of extreme views—only those conclusions being insisted on which have stood the test of the writer's own experience.

School Athletics and Boys' Races. By WILLIAM COLLIER, M.D., F.R.C.P. Issued by the Medical Officers of Schools' Association. Pp. 32. London: J. & A. Churchill. 1901. Price 1s.

IN January of this year there was published over the signature of several distinguished medical men a letter which expressed the opinion that "school and cross-country races exceeding one mile in distance are wholly unsuitable for boys under the age of nineteen, as the continued strain involved is apt to cause permanent injury to the heart and other organs."

The present publication contains the report of a meeting arising from the above letter, and called to discuss the question of school athletics. It is evident from the discussion that there is a good deal of difference of opinion among those who have the best opportunities of knowing the facts as to the effects of long-distance races and runs. An appendix analyses the returns from thirty-eight schools as to the conditions under which races are run, and the evidence as to any injury resulting.

Medical Inspection of Schools. By A. H. HOGARTH, M.B., D.P.H., County Medical Officer for Buckinghamshire, Assistant Medical Officer (Education), London County Council. Pp. 360. London: Henry Frowde, also Hodder & Stoughton. 1909. Price 6s. nett.

THERE can be no doubt that the institution of medical inspection of school children, which is provided for in the recent Education (Scotland) Act, is but a step, albeit an important one, in the progress of preventive medicine. Wherever medical inspection has been carried out, even on a very limited scale, it has been discovered that a very large proportion of children attending the elementary schools suffer from disorders and defects which seriously interfere with their physical development and their educational progress. Indeed, the state of affairs which has been proved to exist in many of our large towns is a reproach to the whole community. The discussion of the means by which this reproach may be removed requires a knowledge of children, experience of school work, and a judicial temperament. These qualifications Dr. Hogarth possesses in good measure, and we can cordially commend his timely work both to those who fear the future socialisation of medicine, and those who pray for it.

The scope of the work is confined to the needs of the elementary

schools. The case for medical inspection, and the responsibility of the State, are stated briefly, but forcibly. An interesting review is given of the legislative efforts of more progressive countries than our own. The relation of school hygiene to State medicine in general is discussed in a chapter in which the author argues that an education committee or school board should have the whole time services of a specialist in school hygiene, and that the important work of medical inspection should not be entrusted to the medical officer of health or his assistant. Schemes for the organisation of medical inspection in various districts are discussed. Chapters are devoted to the methods of the school doctor, the work of the school nurse, and the question of medical treatment at school. The last-named chapter discusses a thorny and difficult question in a temperate and judicial way, and is followed by one which advocates the school clinic as the best solution of the urgent problem presented by the untreated child. The last chapter of the book deals briefly with the diseases affecting school life.

The school medical officer will, in the course of his work, meet with many problems which are not referred to in this book, but as a general discussion of the aims and methods of medical inspection, we can cordially commend Dr. Hogarth's work to the attention of the profession.

Home Nursing. By ISABEL MACDONALD, Certificate, Royal Infirmary, Edinburgh; Lecturer on Nursing and Hygiene to Various Public Committees and Councils. Pp. 326. London: Macmillan & Co., Ltd. 1909. Price 2s. 6d. nett.

THERE are many books on nursing, but the one before us is in the first rank, and can be very highly recommended. It bears evidence that it is written by a nurse of experience, with a large fund of sympathy and common sense, and it is based on a good working knowledge of physiology. Those who read it should carefully study the preface. As it is partly intended as a book of reference for mothers, a good index would be a great advantage.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES AND NEWS.

The new Professor of Surgery.

It would obviously be unbecoming for us to do more than simply chronicle the fact that on 21st July the Curators appointed Mr. Alexis Thomson Professor of Systematic Surgery in succession to Professor Chiene. The suggestion which we made last month regarding the age of retirement was adopted, and each candidate gave a written undertaking to retire at the age of sixty-five. With reference to our other suggestion, we think we may safely say that any modifications in the direction of improving the training of the student in Surgery will meet with no opposition from the new Professor.

The Chair of Anatomy.

Professor Robinson, of Birmingham, is to be Cunningham's successor. Though an Edinburgh graduate, most of his work has been done south of the Tweed, and he now comes back to us with a great reputation, not only as a teacher, but as a capable organiser—a quality which has for long been associated with this particular Chair.

Special Diplomas.

Although we are thoroughly in accord with Sir Thomas Fraser as to the desirability of the University encouraging in all possible ways the work of research in all departments of medicine, we are not convinced that the best means for promoting this is to establish a series of special diplomas. If the University is really to give a "valuable guarantee to the public that the claim for special knowledge in any department of medical practice is a well-founded claim," something more than a nine months' course of instruction followed by an examination is required, and we very much prefer the plan suggested by the Pathological Club in the report which we propose to publish in the October number of the *Journal*. This suggestion is that, in addition to the existing methods of taking the M.D. degree, there should be a new one of taking it with honours in a special subject. Candidates would require to pass the ordinary examination in Medicine, and they might well be expected to pass it on a high grade, while the examination on the subject of their selection

would be a really searching test of special knowledge, which could only be acquired by those who had really devoted themselves to the special subject which they professed.

Post-Graduate Courses.

THE autumn courses will be held in Edinburgh as usual, and will commence this year on Monday, 30th August. During August there will be several classes on the Methods of Diagnosis, and these will commence on 2nd August. Full particulars may be obtained from the Secretary, The Faculty Office, University New Buildings.

Medical Presentation.

DR. CONSTABLE, Leuchars, was lately the recipient of a testimonial from friends and patients on the occasion of his retiral from practice. The presentation was made at the doctor's residence, and consisted of a purse of sovereigns and a silver salver with the following inscription: "Presented to Dr. John Constable on the occasion of his retiral from practice, in recognition of the many services rendered by him to the community of Leuchars and the north of Fife during a period of over forty years." Mr. Hodge, Chairman of Leuchars School Board, made the presentation, in presence of a representative company of subscribers, and alluded with good taste and feeling to the long period of forty-six years during which Dr. Constable had gone out and in amongst his patients, not only as a skilled doctor but as a valued friend. Dr. Constable suitably replied and touched feelingly, yet humorously withal, on the early years of his experience, doing his work on horseback throughout nine parishes. A hearty vote of thanks was accorded to Mr. Hodge, on the motion of Dr. Douglas, Cupar, who spoke to the tactfulness of Dr. Constable's dealings with his brother professionals, and to the manifest personal affection of his patients for Dr. Constable.

"Covering" Unqualified Dentists.

WITH most of the penal cases which came before the General Medical Council at its last session we do not propose to deal; more than one of them pointed the moral of how exceedingly careful medical men should be in their dealings with the opposite sex.

To the matter which forms the heading of this note we do not think the profession as a whole has given sufficient attention.

The unfortunate medical man who was summoned to appear before the Council on this charge was obviously unaware of the gravity with which the Council necessarily regards the offence, and we believe that a good many members of the profession are similarly erring in ignorance. It is the duty of the Council to keep the dental as well as the medical register, and it is the unquestionable duty of the medical

profession to avoid doing anything to countenance the unqualified dentist.

The "covering" consists of course in nearly, if not in every, instance in administering an anæsthetic to the patient while the dentist performs the operation of extraction. It does not matter whether the administration is to a patient of his own or to a stranger; no medical man must administer an anæsthetic for any dental operator whose name does not appear on the dental register.

It seems to us that all that can reasonably be required of medical men is, that before consenting to administer the anæsthetic for any stranger they put frankly to him the question whether or not he is a registered dentist. If he were he should, and probably would, be glad to recognise the support thus given to the qualified dentist, while, if not, the doctor's course is plain—he must refuse to administer the anæsthetic, and no reasonable and, we think, only few unreasonable patients but would see that the risk of his diploma was too heavy a price to pay for a single fee.

Royal College of Surgeons of Edinburgh.

At a meeting of the College, held on 22nd July, the following gentlemen were elected Fellows:—Richard William Anthony, M.B., C.M., Captain, Indian Medical Service; Alexander Watt Beveridge, M.B., Ch.B., Edinburgh; Frederic James Brodie, M.D., Toronto; Robert Donaldson, M.B., Ch.B., Liverpool; Ethelbert William Dyer, M.B., Ch.B., Edinburgh; Edward Alexander Elder, M.B., Ch.B., Edinburgh; Carlton Atkinson Ellis, M.R.C.S.Eng., London, N.; Ernest George Ffrench, M.D., Captain, Royal Army Medical Corps; Samuel Thompson Irwin, M.B., M.Ch., Belfast; Harley Patterson Milligan, M.D., Edinburgh; Ronald Roderick Murray, M.B., Ch.B., Edinburgh; Herbert Charles Orrin, L.R.C.S.E., Edinburgh; John Alexander Pottinger, M.B., Ch.B., Stromsay; Eliyatamby Visuvalingam Ratnam, L.R.C.S.E., Colombo; Harold Ernest Rawlence, M.B., M.R.C.S.Eng., Edinburgh; Alexander Macdonald Westwater, L.R.C.S.E., Liaoyang, Manchuria.

THE PROMOTION ADDRESS DELIVERED TO THE MEDICAL GRADUATES OF 1909.

By Sir THOMAS R. FRASER.

Fellow Graduates,—It is now my privilege to offer you the most sincere and hearty congratulations of the Senatus, and, in the case of the larger number of those whom I address, the specially warm congratulations of the Faculty of Medicine, on the successful attainment of the academic honours which has been one, at least, of the objects of your studies.

The present occasion constitutes, gentlemen, the third on which this most interesting duty and pleasure has been granted to me. The intervals separating these occasions are to be measured by considerable numbers of years. It has been vouchsafed to only a few of my colleagues to have held office for so long a time as to be qualified thrice to act as Promoter.

While this may be regarded as a cause of personal gratification, the gratification is tempered by the reflection that it has been attended with the loss of many friends and colleagues. So much is that the case, that there no longer remains in the Faculty of Medicine any one of the members who constituted that Faculty when I had the honour of becoming a professor, and even in the Senatus there is only one member—the Professor of Sanskrit. When I first became a member, the Faculty of Medicine contained so distinguished members as Rutherford, Grainger Stewart, Simpson, Wyville Thomson, Crum Brown, Balfour, Sanders and Lister, and also Turner, who, however, still influences for good the work of the Faculty, although he has left it for a sphere of wider and larger University importance and dignity. Again, when I compare with to-day the occasion when I was Promoter for the second time—the year 1894—there remain of those appointed to fill the vacancies that had occurred only three Professors out of the full complement of twelve, namely, Greenfield, Ewart and Bayley Balfour.

Gentlemen, these changes in the personality of the Senatus, these vicissitudes of time, fall to be chronicled in almost every succeeding year. To-day we are not free from the duty of recalling them.

In our own Faculty, we deeply lament the recent death of Dr. Cunningham, the Professor of Anatomy and Dean of the Faculty

of Medicine. A student and graduate of this University, a Demonstrator and Assistant in Anatomy, and afterwards a Professor of Anatomy for twenty years in Dublin University, the holder of many offices of distinction, and adorned with many academic honours, Daniel Cunningham succeeded, with universal approval, in 1903, to the Professorship, then resigned by our venerable Principal. In his short tenure of only six years of the Chair of Anatomy in this University, Professor Cunningham has fully maintained his great reputation as an anatomist and as a teacher, as well as the high traditions of the office to which he succeeded. A man of strong personality, of kindly and affable disposition, and of well-trained business habits, he acquired a remarkable influence in the affairs of the University and in the medical profession generally, and he quickly gained the respect and affection of his colleagues and students. With a personality which seemed the embodiment of physical strength and vitality, it was a painful shock to all of us to learn that an incurable malady had affected him, and we yet lament the tragedy of a life cut off in the maturity of its prime.

Still another vacancy has to be recorded in the Faculty of Medicine, but, fortunately, we look for the continuance of a life of much usefulness on the part of Professor John Chiene, who has recently resigned the Professorship of Surgery. In the presence of my friend, I am embarrassed in the desire I have to estimate his services to the University. It is well known to all of us that he is an ardent disciple of Lord Lister, that he is a great prophet of "common sense" and of the perhaps irreconcilable combination of "common sense" with the asceticism of the "simple life," and that humour and sound surgery have always characterised his classroom and hospital teaching. During the twenty-six years in which he has so worthily occupied the Chair of Surgery, these characteristics have inevitably made a strong impression for good upon the several thousands of men who have been his students, and that impression has been emphasised and strengthened by the great friendliness of his intercourse with them, and by the obvious and transparent desire on his part to further their educational and personal interests and well-being.

As the University has thus been deprived of the services of a veteran teacher, we now cordially welcome his successor. Mr. Alexis Thomson has already made for himself a great reputation in the science and practice of Surgery, which we all feel satisfied he will fully maintain as Professor of that subject.

Although he has not been a member of the Faculty of Medicine, there is a member of the Senatus, Professor Kirkpatrick, whose resignation this year has also caused much regret to his colleagues. We all know him to be an eminent lawyer and historian, an accomplished linguist, and a man of affairs, who for a number of years filled the exacting and important office of Secretary of Senatus, and thus became well known to a large body of the undergraduates and graduates of the University. He is also recognised as a benefactor to education and to the public by his inauguration of the highly successful vacation courses of instruction in literature and modern languages; and, while the University will suffer from the loss of his professorial services, it is a gratification to know that his health and strength are not so much impaired as to require him to relinquish his most valuable work and guidance in connection with these vacation courses.

Having thus briefly referred to the recent changes among the holders of professorial appointments in the University, it may be of interest to refer also for a few moments to other changes that have occurred. I have no intention, however, of reviewing the vast field of those changes that is represented in University Acts and in re-modelled, if not improved, Curricula.

The improvement of the curriculum of study for medical degrees is a subject which has ever been before us during the long period that I have been a member of the Senatus, and I fear it will hang over the Faculty of Medicine for many other years. It would be equally distasteful to me to speak of University reform, for I received a surfeit of it in the days when I was Dean of the Faculty of Medicine. The learned Principal and I can remember many a battle and many a victory, and not a few defeats, in committee-rooms and in the lobbies of both Houses of Parliament, in the eighties of the last century, when the interests of the University—and especially of the Faculty of Medicine—were endangered by successive Medical and University Reform Bills.

Looking back, however, to the last occasion on which I held the position of Promoter, I find that the address which I then gave had as its chief topic an appeal for the furtherance of original research in the University. It is most gratifying to find that during the succeeding fifteen years a remarkable advance has been made in this high department of education. This University, in common with the other Universities of Great Britain, had remained tied to its tradition that in natural science at any rate its function

as a university was largely restricted to the diffusion of existing knowledge; and the great function of the highest teaching organisations, that of producing or creating new knowledge—even if it were done merely for the purposes of higher education—was to all intents and purposes ignored. Financial requirements, further, were inadequate, and as the University had not sufficiently recognised the importance of the higher education by research, a statement of their views and an appeal for the required financial endowments had not been made.

As I have said, however, this apathy has given place to an active policy of encouragement of original work. The high standard which during recent years has characterised so many of the theses of doctors of medicine is a gratifying evidence of its advance; as well as the work after graduation of so many of the graduates of the University. The means for including research among the educational activities of the University has been supplied liberally by enlightened donors, and by their aid, laboratories and research scholarships have been provided. Since 1894, so large a sum as £31,719 has been presented to the University for these purposes, irrespective of the liberal grants of the Carnegie Trustees and of the Endowment Fund of that good friend of the University, the late Mr. M'Kie. There can be no doubt that we have not yet reached a position of financial perfection. Larger endowments are required, especially to enable our younger graduates to engage in it; for the nature of the work is in many respects peculiarly fitted for the youthful mind, as enthusiasm and the powers of inception and of imagination are among the most valuable of the requirements for success. The important result, however, is that higher education by research has now established for itself a firm position in our University system, and its further development may be regarded as assured. Instead of a University being regarded merely as an institution for imparting acquired knowledge, at which the actual growth and extension of knowledge is ignored or is relegated to a secondary and very unimportant position, so remarkable, within this period, has been the appreciation of the value of scientific research in this country, that there are now institutions whose sole function is original investigation, among the first to be instituted of which are the research laboratories of the Royal College of Physicians of Edinburgh. So far as this University is concerned, the ideal to be aimed at would be the appropriate combination of both purposes, and much progress has now been made in attaining this ideal.

Nor is it remarkable that the University should thus follow the trend of public opinion. The daily increasing educated classes of the country are learning to appreciate the great advantages that have directly resulted from scientific research, both in its physical and biological aspects. To refer only to the latter, from the laboratory researches of the investigator, a new sanitation and new methods of preventing and treating disease have been evolved, so that the mortality from tuberculosis has been reduced by nearly one half; antiseptic surgery has been established with incalculable benefits, diphtheria has been nearly shorn of its fatal terrors—in one city, for example, a previous death-rate of 158 has become one of 38 in each hundred thousand of its population. The death-rate from maternity in hospitals has been reduced from upwards of 10 to less than one per hundred mothers; the dreaded disease, hydrophobia, has been transferred to the category of a nearly always curable affection; and the mortality of 80 to 90 per cent. from cerebro-spinal fever in children has become one of less than 3 per cent. In many cities of America where yellow fever annually devastated the population, this fatal disease has now become extinct; and by laboratory experiments and researches similar in kind to those by which these great benefits to mankind have been gained, the knowledge that has been acquired regarding malaria allows it not only to be curbed and controlled, but so effectually dealt with where the required enterprise and resources are available, that its entire extinction may hopefully be anticipated.

It has no longer become necessary to advocate the claims of original research to full University recognition, not only because of the eminent position it must in future always occupy as a means for developing the intellect, but also because of the growing appreciation of the almost incalculable benefits which it confers upon mankind.

Is there, however, no other direction in which the University may develop, and thereby increase her usefulness? As in the case of original investigation, so also in that of the development of specialities, within my own personal experience, there has been not only lukewarmness, but also a spirit of hostility. The advance of knowledge in many lines, even in the comparatively restricted subject of medicine, has, however, been so great as to exceed the capacity of any individual to retain or even to receive all that knowledge; and in many directions it has not proceeded so rapidly as it otherwise would, because of the insufficient concentration of thought and of work on specialised subjects. This

need for restriction of attention is indeed an evolution which has long ago shown itself in medicine. Surgery has become in that sense separated from general medicine, and still more recently, midwifery and gynecology have become recognised as subjects requiring the chief attention of those who have specially attached themselves to these departments of the science and practice of medicine. This separation is fully recognised by the University, and the medical curriculum has been so arranged that each subject should be adequately taught.

There are, however, other subjects that are now ripe for similar separate recognition, among which may be instanced Insanity, Ophthalmology, Diseases of the Throat and Ear, and perhaps also Diseases of the Nervous System, excluding Insanity.

They have in practice established for themselves a special position, but the University has not, as yet, fully accorded to them the educational position which they require, as the best condition to secure their advancement as departments of knowledge. The time seems to have come when the University should more fully exercise the privilege granted by the last Universities Commission of offering diplomas in these subjects.

As was pointed out when the recommendation to institute diplomas for graduates of medicine in special branches of medical and surgical practice was placed before the Commission, these diplomas should be granted for specialised study; and recalling what occurred, in the regrettable absence of the publication of the evidence presented to the Commission, the nature of the education in the case of the subjects I have mentioned was explained to the Commission.

For the Diploma in Mental Diseases, for instance, the education should include courses of theoretical and practical study in the anatomy and physiology of the brain, in psychology, and in asylum work; and for the Diploma in Ophthalmology, the anatomy and physiology of the visual organs, including their nerve relationships, optics, and the clinical study of diseases of the eye.

Without entering into similar details respecting other subjects, the courses of instruction, it may be remarked, would generally extend over a period of nine months. The successful student would be accorded a diploma, implying that he had been specially instructed in the subject, and giving a valuable guarantee to the public that the claim for special knowledge in any department of medical practice is a well-founded claim.

In the meantime, the University has instituted a diploma for

specialised study in the subject of Tropical Diseases only. The requirements of advanced study fully exist also in the highly important subject of Public Health, and the need of a diploma with preparation restricted to a single academic year is being demonstrated by the large number of our graduates who proceed to Cambridge, London, and elsewhere to obtain a diploma unobtainable at their own University. There seems no reason why this diploma should not be instituted in addition to the existing degree in Science in Public Health, which, after all, is taken by an insignificantly small number of men only.

While these considerations, gentlemen, can have no immediate bearing upon the academic work of the undergraduate, they are directly applicable to yourselves. Many of to-day's graduates will continue to, or are about to engage in original research. Whatever may be your future work, you will, however, recognise that research and advanced study in special departments of medicine merely constitute two of the methods by which the powers of observation and judgment may be trained and the mind taught to appreciate truth and to strive to obtain it. It is one of the supreme attractions of the profession into which you have entered that whatever be the nature of the work with which you may be occupied, the opportunity will be given to you of cultivating these high attributes. Your profession will also supply you with many occasions to exercise charity and affection and brotherly kindness, not only in your relation to patients but also to your fellow practitioners.

On behalf of my colleagues, gentlemen, I now most heartily and earnestly wish you God-speed. In all your future actions, I know that you will never cease to remember that you are graduates of a venerable and renowned University, whose honour and reputation are largely in the hands of her younger members.

A CLINICAL LECTURE ON RETROVERSION OF THE UTERUS AND ITS TREATMENT, WITH SPECIAL REFERENCE TO THE OPERATION OF SHORTENING THE ROUND LIGAMENTS.

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GENTLEMEN, retroversion of the uterus is either congenital or acquired.

Congenital Retroversion.—When it is met with congenitally it is due to a developmental defect. In four cases which I recollect I found on abdominal section that the displacement was due to shortening of the infundibulo-pelvic ligaments. In a number of cases I have found the same condition produced by shortened utero-sacral ligaments attached abnormally high, and again I have frequently observed retroversion produced by an uncommonly short tense anterior vaginal wall pulling the cervix forward. In the unmarried, I believe, the uncomplicated congenital retroversion as a rule gives rise to no symptoms, and therefore it rarely calls for treatment. In the married, treatment is indicated when symptoms are marked and one is sure that they are caused by the displacement; or when the patient is anxious to have the condition corrected so that her prospects of childbearing may be improved.

Treatment of congenitally shortened ligaments means opening the peritoneal cavity, and this course is justified in such cases as I have mentioned. Expose the ligaments, apply a double ligature, and divide between them; then perform a suspension operation to keep the uterus in anteversion. This method of treatment has been in my experience in more than one case followed by the happiest results, the patients having become mothers after years of suffering and sterility.

The operation of lengthening the anterior vaginal wall is easily performed by dividing the wall transversely and suturing it in such a way that the transverse wound becomes longitudinal. The posterior wall can be shortened, if desirable, by adopting a method the reverse of the above.

Acquired Retroversion.—Acquired retroversion is either complicated or uncomplicated, and they differ widely from each other. In the former, the complication is due to diseases of the uterine appendages arising independently of the displacement. In the

complicated retroversion the displacement is of secondary importance. It is only an incidental accompaniment of the actual disease, and bears but a trifling relation, if any at all, to the patient's symptoms. The displacement is the result of the adnexal disease, and treatment is directed to the removal of these conditions. The correction of the displacement in such cases is secondary and subsidiary.

In nearly every complicated case the uterus is fixed. The remedial measures to be pursued in this class of case consist in treating the diseased appendages by abdominal section, removing the diseased tubes and ovaries, or merely releasing them from their adhesions. The uterus will then be rendered freely movable, and can be brought back into its normal position and fixed there by one of several methods.

The method to be adopted depends on whether or not the patient has been unsexed. If both tubes or both ovaries have been removed the proper procedure is ventro-fixation. This operation consists in fixing the fundus uteri with non-absorbable sutures into the abdominal wound. If, on the other hand, one ovary and one tube have been removed, and the patient is still able to bear children, the operation of ventro-suspension, or better still shortening of the round ligaments by drawing them through a stab wound in the abdominal wall and fixing them to the fascia, might be the method adopted, because after either of these operations the uterus, should it become impregnated, will not be hindered in its ascent into the abdominal cavity.

Uncomplicated Retroversion.—We will now consider some clinical features of the pure uncomplicated retroversion, and when we speak of retroversion we include retroflexion. Before proceeding further, however, it is necessary to qualify the word "uncomplicated," because there are very few retroversions that are free from the complication of metritis, but such complication is subsequent to and consequent on the displacement. In the sense used here, the term "uncomplicated" means that there is no inflammatory complication of the surrounding parts. I will mention, in the first place, three outstanding clinical features. The first is that in nearly every case the displacement is of puerperal origin; the second is that nearly every case dates from the first confinement; and the third is that in all the uterus is freely movable. The displacement is invariably as old as the patient's oldest child. Retroversion does not prevent pregnancy, and it is nearly always in the first labour that yielding of the supports takes place. The

retroversion of puerperal origin, even when it has existed for years, is still mobile. The displaced uterus does not contract adhesions. It becomes hypertrophied, and is often so firmly held in its new position that one is apt to think it is fixed. But before concluding that such is the case, give the patient an anæsthetic to enable you to use some degree of force in your attempt to dislodge it, and in the great majority of cases, if not in all, you will discover that fixation was only apparent.

Symptoms.—It is true that many old-standing cases of retroversion present no symptoms, but these cases do not concern us, because they do not consult us; such displacements are only occasionally discovered when the patient asks our advice regarding some other trouble. The great majority of patients with retroversion have symptoms, due, in the first place, to the displacement itself, and later to the metritis which develops as a consequence of the displacement. Some state that the symptoms which a patient with retroversion complains of are not due to the displacement but to something else. This statement can be disproved by the fact that symptoms quickly disappear when the displacement is corrected, say with a pessary, and as quickly appear when the pessary is withdrawn. The earliest symptom is bleeding in the puerperium. This may continue for months, and though constant is never abundant. Bleeding in the puerperium might be associated with other conditions, such as cancer of the cervix, but it is most commonly due to retroversion. Another symptom, though not met with in every early case of retroversion, is absolutely pathognomonic when it does happen. *i.e.* the occurrence of menstruation during lactation. I have never met with a case in which this was present without there being at the same time retroversion of the uterus. Down-bearing pain and backache may be considered the cardinal symptoms of an established retroversion. The down bearing is due to the low position of the uterus, and is especially marked when the retroversion is accompanied by a degree of prolapse. The backache is caused by the stretching of the utero-sacral ligaments. An ache is also frequently complained of in the sides, and is probably due to stretching of the attachments of the broad and round ligaments. All these symptoms disappear when the patient lies down. The metritis, which is the chief complication, is responsible for the menorrhagia, leucorrhœa and dysmenorrhœa. These appear when the displacement has been in existence some time. The commonest referred symptoms are headache and gastric pain, and

a very troublesome symptom, which is not uncommon, is mental depression. In talking of symptoms, one is struck with the fact that while there are always one or more symptoms which may be said to specially characterise any pelvic affection, yet there exists a similarity in symptoms common to many gynæcological affections differing widely in origin and position. So much so is this manifest, that it is in very few cases that a diagnosis can be made from symptoms alone. If, for example, one compares the symptoms of fibro-myoma and retroversion, the similarity is found very marked. Many patients with fibroids pass through life without presenting any symptoms. Many retroversions behave in the same way. Menorrhagia is common to both, and in most cases is due not to the disease but to the accompanying metritis, which is a consequence of the disease.

Retroversion does not preclude pregnancy. Many women with retroversion conceive and carry the fœtus to full time without any symptoms. The uterus in such cases as it enlarges ascends into the abdomen and all goes well. Some, however, are not so fortunate. About the third month the uterus, instead of rising into the abdomen, becomes incarcerated, and then gives rise to pressure symptoms, the chief of which is retention of urine, and this is the only occasion in which the urinary organs are markedly affected by retroversion. A large swelling appears in the lower abdomen, formed by the distended bladder, and if the incarceration is not relieved abortion is inevitable and also serious bladder changes, such as exfoliation of the mucosa.

Production of Retroversion.—I have stated that in most cases this retroversion is of puerperal origin, and it is easily understood how it is produced. When the uterine supports are normal and the bladder is empty, retroversion cannot be produced. Increased intra-abdominal pressure can only increase the anteversion. In the puerperium the uterus is heavy, the ligaments are lax, the pelvic floor may have yielded, the uterus frequently lies retroposed, the mother makes an effort and the increased intra-abdominal pressure easily produces the retroversion. It is also possible for increased abdominal pressure to retrovert the uterus at other times, as when the bladder is distended, then the uterus is retroposed and abdominal pressure may so act on it that the fundus is dislocated behind the promontory of the sacrum and remains there, while intra-abdominal pressure will continuously act on the anterior surface of the body.

Let us now look at the diagram of retroversion and compare

it with one of the uterus in normal position. Compare the position of the fundus, the position and direction of the cervix. Look at the altered state of the utero-sacral ligaments. Here the pelvic floor and utero-sacral ligaments have given way. The cervix has rotated to the front, the fundus to the back, and the uterus lies low in the pelvis.

Treatment of uncomplicated retroversion consists of replacement and retention. Replacement can be performed by several methods. Retention is accomplished by (1) pessaries, (2) surgical means. The pessary is usually palliative only. It seldom cures the condition. It may be successful in maintaining the position of the uterus and in relieving the patient of her symptoms, and in some cases may even effect a cure, viz. in those cases where the structures concerned in the support of the uterus have not undergone such changes as to make them utterly useless in maintaining the organ in good position. The pessary gives the supporting structures rest and thereby enables them to regain tone. This we expect to happen in recent cases, and it is correct treatment to give those cases a trial of pessary treatment first. Surgical treatment is indicated when the pelvic structures have lost their power of supporting the uterus. How can we tell that this power is lost? If a pessary has been worn for some months, and if, after its removal, the uterus falls back, the supporting power is gone. You can form an idea of the tonicity of the structures by replacing the uterus and noting if it stays up for a short time. If it stays up the supports have tone. If it immediately falls back the prognosis as to the recovery of the tonicity is not good. The pessary has, however, a field of usefulness, not only in recent cases, but in cases that are complicated by serious organic disease, forbidding operation, and also in cases where the patient won't hear of operation. The great drawback to pessary treatment is its indefiniteness—indefiniteness as to the length of time the patient will require to wear the pessary, and indefiniteness as to the result after it has been worn, and in this respect it compares unfavourably with surgical treatment, by which you can definitely promise the patient that she will be cured in a month. But if, when called to a case of retroversion, you decide to adopt pessary treatment, you may temporarily relieve the patient, and if you do not cure the condition so as to be able to dispense with the pessary, still your labour will not have been altogether thrown away. Your treatment will have been of service in preparing the patient for the operator. But before

a pessary is introduced, the uterus must first be prepared for replacement, and be afterwards replaced.

Preparatory Treatment. — When you examine a uterus that has been retroverted for some length of time, you will find that it is congested, enlarged and tender. Before attempting replacement, it is well to get rid of this congestion and of this tenderness. The best medicament for this purpose is boro-glyceride applied on cotton-wool. The following prescription, which I think was a favourite of Marion Sims's, I have used for years, and have found most satisfactory:—

R Boro-glyceride } Aluminis }	. . .	āā ℥ss.
Glycerinum .	. . .	ad ℥xvi.

A pledget of cotton-wool is soaked in this mixture and introduced up to the vaginal roof with the aid of Sims's speculum, the patient being semi-prone, or, better still, in the elbow-knee position. The action of the boro-glyceride and glycerine is to provoke a free watery discharge and thereby deplete the uterus and surrounding tissues, removing the congestion, and also by its sedative action getting rid, at the same time, of the tenderness. Boro-glyceride is superior to ichthyol which is so commonly used. This pack can be left in the vagina for days without any decomposition taking place. I generally introduce one twice a week, say, on Mondays and Thursdays. The pack introduced on Monday, the patient removes on Wednesday night, takes a douche that evening, and also on the following morning before another pack is given. After a short time, say, three weeks of this treatment, you will find on examination that the uterus is smaller, is not tender, and that its mobility has increased, rendering its replacement an easy matter. In some instances, indeed, you will be surprised to find that the uterus is no longer retroverted, but is in normal position.

Replacement. — The uterus being now ready for replacement, the question is, how are you going to do it. Are you to use an anæsthetic or not? In many cases an anæsthetic is not necessary because replacement is so simple, but in the majority of cases it is better to use an anæsthetic on account of the manipulative freedom which it gives. The important point is to make sure, whatever method of replacement you employ, that the uterus is in good position when you introduce the pessary—that it has not fallen back. The patient lying on her back, the fundus is

held forwards with the left hand, while the pessary is introduced with the right. After the pessary has been placed make the bimanual examination, and be satisfied that you leave the uterus anteverted, and the pessary in position.

Not only must you be sure that the pessary is in position, but you must make certain of a point of equal importance, and that is that the pessary fits, that it is of the correct size. The success of the pessary, I believe, depends on this more than on the shape of the pessary. How are you to determine that the instrument fits? Pass your finger between the lower end of the instrument and the pubic arch. If you find that you can comfortably place your finger in that space, the instrument is of proper size. If you cannot do so, the instrument is too large. If more than one finger can be easily inserted there, the instrument is too small. This simple guide I have found to be practically invaluable. Another aid is to ask the patient half an hour or so after the pessary has been introduced to rise and walk about, and if the adjustment is correct, she will tell you she feels nothing, is quite comfortable, and may ask if you have really put in an instrument. Make sure before introducing the pessary that it is perfectly clean, else vaginitis may be provoked. Pessaries are made either of soft or hard rubber. The soft are cleansed by boiling, the hard by brushing and antiseptics. They must not be boiled, because boiling changes their shape. Whilst wearing a pessary, the patient uses the vaginal douche daily. The soft rubber pessary must be removed frequently and thoroughly purified. When left longer than a month it becomes very foul. The hard rubber pessaries may be left in for months. Keep a note of all your patients wearing pessaries. When a pessary fits comfortably the patient may neglect to have it removed, and she may come to you, or more likely to another practitioner, years after, to have the instrument dug out.

I have, as yet, said nothing to you, gentlemen, as to the kind of pessaries that you are to use for retroversion. Their name is legion. I seldom use any other than the "Hodge" or "Hodge-Smith" pessary; occasionally the soft rubber ring. I think the "Hodge" fulfils the requirements as well, if not better than any other, but I would again state that I consider the size of the instrument is of as much importance as the shape. Always replace the retroverted uterus before introducing the pessary. Don't expect that the simple introduction of a pessary will change a retroversion of the uterus into an anteversion. Such does not

occur, but what takes place is that the body rides over the upper bar in a state of exaggerated retroflexion, and the cervix gets between the instrument and the pubes—a state of affairs which cannot be tolerated by the patient. Having chosen and adjusted our instrument, we may now ask ourselves, how does it act? You will remember at the beginning of the hour, in speaking of the uterine supports, I said that the function of the utero-sacral ligaments, combined probably with this newly described ligament, the transversalis coli, was to keep the cervix towards the sacrum so that intra-abdominal pressure would act on the posterior surface of the uterus, and in this way keep the uterus in anteversion. When the uterus is retroverted, the utero-sacral ligaments are lengthened, and no longer possess this function. The pessary acts by forcing up the posterior fornix, by making tight the vaginal wall in this position, and thus carrying back the cervix towards the sacrum—by taking on, in fact, the function of the utero-sacral ligaments. The pessary is kept in its place chiefly by the integrity of the levator ani muscles, and also by the perineal body.

Now, gentlemen, as I have said, when the instrument is chosen aright, and is properly introduced, the patient may, in a suitable case, feel perfectly comfortable and perfectly satisfied, and, indeed, may have no desire to part with her pessary. The unfortunate feature with regard to all this is, that after all your patient in most cases is not cured. Remove the pessary, the uterus falls back, and the old symptoms return. After months or years of this treatment either you or your patient, or both, may tire of it, and wish something done that is curative. Well, gentlemen, what are you to recommend? Surgical means. In my opinion there is one operation, and one only, that holds the field, viz. the operation of shortening the round ligaments, and I will tell you why. (1) It is an extra-peritoneal operation, and therefore one of little risk. It has no mortality. I hold that for a minor ailment, such as an uncomplicated retroversion, which does not cause any danger to life, we have no right to perform a major operation. We have no right to open the peritoneal cavity. (2) It leads to no interference with pregnancy or parturition, and after delivery the uterus remains in normal position. (3) It is practically certain in its results, and these results are as good as those of any intra-peritoneal operation. I have now performed this operation over 200 times, and I am not aware that one out of that number regrets having had the operation. The statistics testify to its efficacy.

TABLE OF CASES.

Total number of cases	214
Number of uncomplicated cases	147
Number of complicated cases	67
Number of uncomplicated cases heard from	78
Number well	77
Number married	68
Number single	10
Number pregnant (full time)	31
Number miscarried	2
(8 had 2 children)	
(22 had 1 child)	
(1 had twins)	
Number of complicated cases heard from	24
Number well	9
Number married	22
Number single	2
Number pregnant	4
(2 had 2 children)	
(2 had 1 child)	

I have performed the operation which I will presently describe 214 times for retroversion of the uterus. Of that number 147 were uncomplicated cases, the uterus being movable and unattended by disease of the adnexæ, and therefore eminently suited for the operation. Seventy-eight of these patients have either been heard from or have been examined by me subsequently, and in 77 instances the patients have been found free from their old symptoms, and in every instance that I have been able to make an examination the uterus has been found in good position. Of the number who answered our inquiries 68 were married women, and 31 of these had been pregnant since the operation and have carried to full time.

In 67 patients the operation was performed as an experiment in complicated cases where the uterus though mobile was accompanied by enlarged ovaries, and therefore not typically suited for the operation, the idea being that the correction of the displacement might be followed by the cure of the ovarian trouble, especially if the disease were in an incipient stage. Twenty-four of these patients answered our inquiry, and 9 of the number expressed themselves as being well. Twenty-two of these were married,

and 4 of their number had had successful pregnancies after the operation.

The function of the round ligaments being to restrain the uterus from excessive backward movement, the operation of shortening the round ligaments enables those ligaments to resume the function which they have lost.

Alexander's original operation consisted in cutting down over the external abdominal ring, isolating the ligament, drawing it out the desired length, stitching it to the columns of the ring, and cutting away the superfluous pubic end of the ligament.

Various modifications have been made by different operators. Two essentials are requisite for success—first, a suitable case, and, secondly, an operation correctly performed. A suitable case is an uncomplicated retroversion. The operation which I recommend is as follows:—

1. After curetting the uterus, an incision is made immediately above the pubes, extending for a distance of about $2\frac{1}{2}$ inches. The incision is made through skin, superficial fascia and fat (Fig. 1). Retractors are then placed at one end of the wound, one being placed parallel to Poupart's ligament, the other parallel to the inner aspect of the thigh. Strong traction is now made with those retractors, so that the edges of the wound are widely separated, and the inguinal canal area is exposed; but before reaching the inguinal ring, a well-defined layer of deep fascia has to be reflected (Fig. 2). This is best done by dividing it parallel to the fibres of the external oblique. Divide it about an inch above the pubic spine, carry the knife down to the aponeurosis of the external oblique muscle, and then reflect it downwards until the external opening of the ring is exposed. You have now before you the glistening tendon of the external oblique muscle, and you will have no difficulty in recognising the ring, which is situated immediately external to the pubic spine. Here you will recognise the columns of the ring, the fat protrusion, and the genital branch of the genito-crural nerve.

The suprapubic transverse incision has two advantages over the one commonly used. Its position above the pubes renders it less liable to contamination, and it also permits of free retraction and good exposure of the inguinal area.

2. Before proceeding further divide the intercolumnar fascia, pick up with a hook the mass, filling up the external ring, then separate carefully the ligament from the fascial sheath (Fig. 3). Having done this, you will be able to draw out the ligament.

Fig. 1.

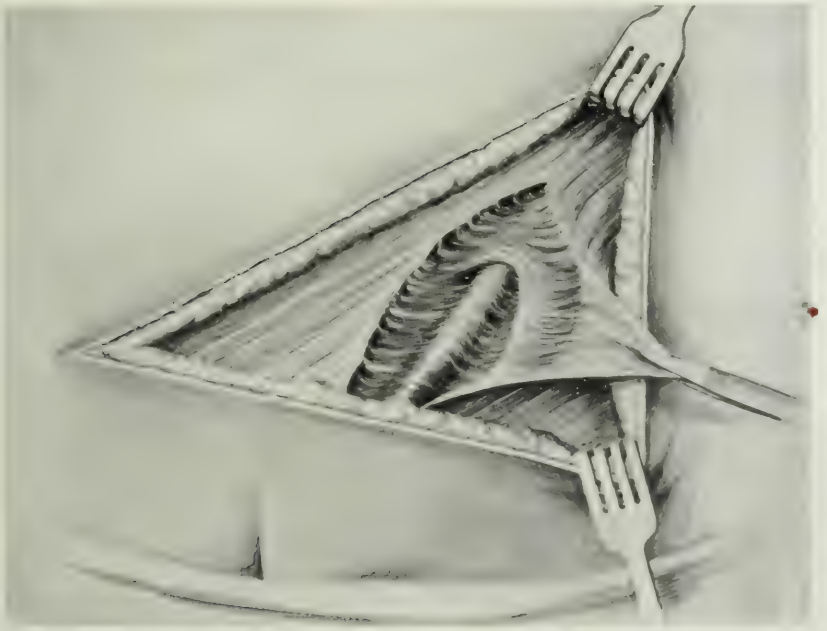

Fig. 2.

Fig. 3.

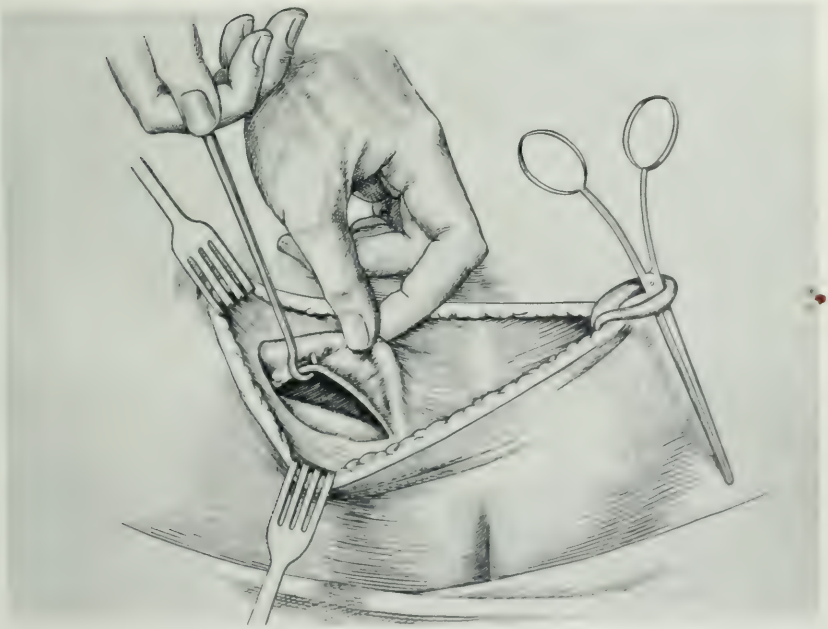

Fig. 4.

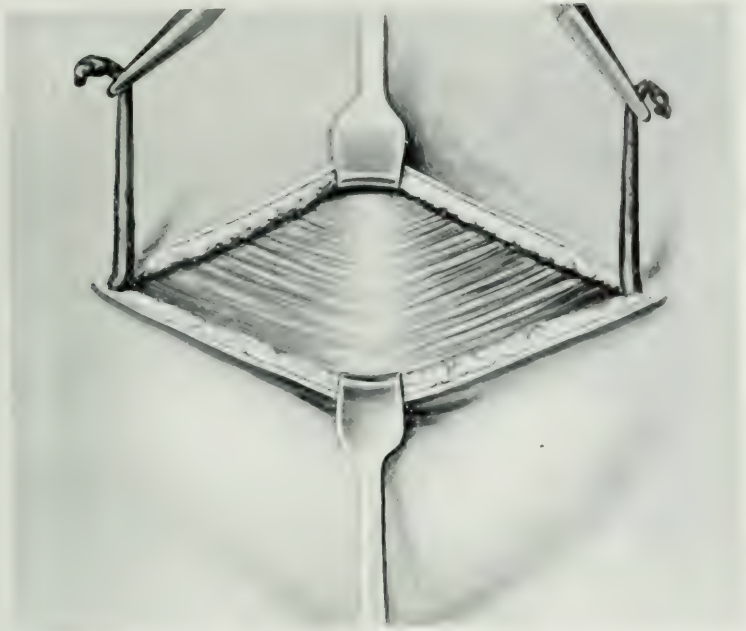

Fig. 5.

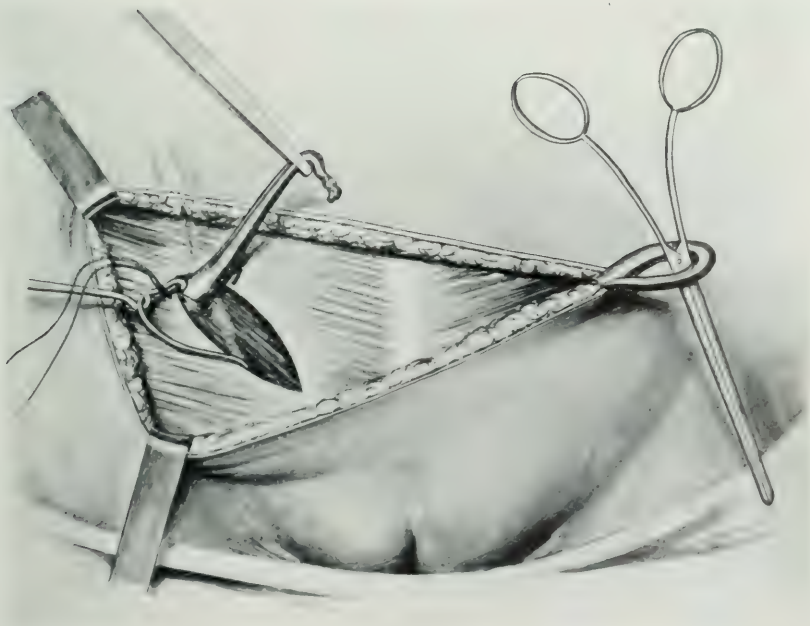

Fig. 6.

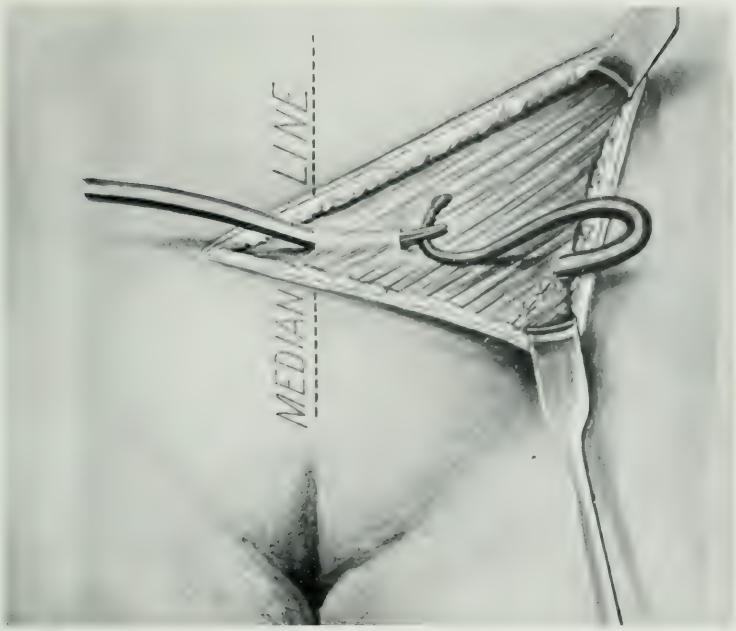

Fig. 7.

Fig. 8.

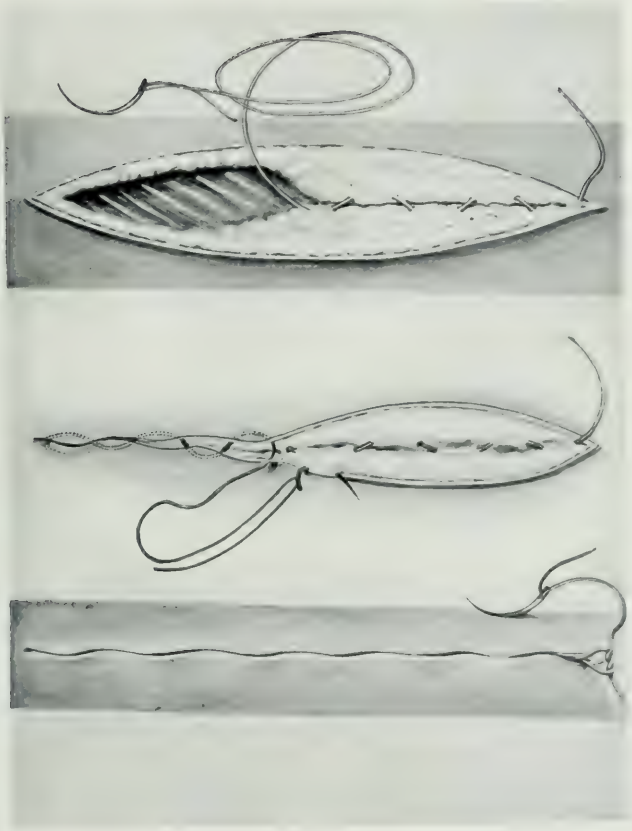

Fig. 9.

In doing so, make gentle, steady traction, and withdraw it until it presents a distinct shoulder. This indicates that a point near the uterine horn has been reached.

3. Treat the ligament of the opposite side in a similar manner (Fig. 4.—Note the position of the nerve on hook).

4. Divide both ligaments near the pubic spine and suspend them. Make equal traction on both to keep the uterus in the middle line (Fig. 5).

5. Pass two fingers of the right hand into the vagina to ascertain that the fundus is in the desired position, and at the same time introduce a Hodge pessary.

6. Pass a stout catgut suture through each ligament at the outer end of the ring, passing the suture through Poupart's ligament, the round ligament, and the external oblique muscle successively (Fig. 6). Draw the ligature tight—take care not to include the nerve. Close the external ring carefully with strong catgut.

7. The ligaments are now anchored, but for additional security pierce the aponeurosis in the middle line and again about an inch from the external ring and draw the detached end of one ligament through (Fig. 7). Repeat this manœuvre on the other side, and suture both ligaments to the fascia in the middle line, and also at the other points where they emerge through the aponeurosis. If the ligaments are long enough, the ends may be farther carried down to each pubic spine and fastened there (Fig. 8, semi-diagrammatic).

8. Bring the fat and fascia together with medium catgut, and, lastly, close the skin wound with a subcuticular stitch of fine catgut (Fig. 9).

9. Keep the patient in bed a fortnight. Remove the pessary before dismissal.

THE ANATOMY AND HISTOLOGY OF THE PREGNANT TUBE.[1]

By JAMES YOUNG, M.B., F.R.C.S.,
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THE following paper is based on an investigation of the anatomy of five cases of tubal pregnancy. For four of the specimens I am indebted to Dr. Haig Ferguson, and for the fifth I have to thank Mr. N. T. Brewis.

CASE I.—This specimen, which was removed by operation twenty-four hours after the onset of acute abdominal symptoms, and presumably about the same time after rupture, is shown in Plate A, Fig. 1. It consists of the left tube, the ampullary portion of which is greatly distended to form the gestation sac. A large rent is shown in the posterior tube wall, through which the fœtus and membranes, surrounded by blood clot, had been extruded. The fœtus measures 3·8 cm. in length, which corresponds to a pregnancy of about two months.

As the result of the rupture the relation of the component parts is considerably distorted, and the specimen is rendered useless for a satisfactory study of the structure of the ovum bed. By restoring the fragments as far as possible to their original positions the anterior aspect of the sac would seem to have been formed by a mass of blood clot, to which are attached portions of the membranes. This is not represented in the figure. The posterior wall was apparently formed by the remainder of the membranes and blood clot, represented in the lower part of the drawing. Here some fragments of the tube wall were detected. The amniotic cavity is seen, and on the upper aspect the villi are shown, as it were, sprouting through the blood clot. This would seem to indicate the point of rupture of the tube wall.

The mucous membrane lining the anterior portion of the tube wall and the lateral flaps represented in the figure is intact, showing that the ovum bed was formed entirely by the posterior aspect of the tube, and that in the growth of the ovum the two walls remained separate. The tube lumen can be seen opening into each pole of the gestation sac. The tubal fimbriæ are

[1] Communicated to the Edinburgh Obstetrical Society, July 1909.

swollen and are distinctly retracted within the tube lumen. The abdominal ostium is patent in the sense that a large probe can be introduced with ease. The tube on the inner side of the gestation cavity is markedly convoluted.

The special interest of this case lies in the opportunity it presents for the study of decidual formation. Transverse sections of the tube demonstrate a well-marked formation of decidual cells in the mucous folds, extending from the uterine end of the divided tube throughout the entire length of the tube to the fimbriated end, and including the tubal folds on the anterior wall of the gestation cavity. Most of the fimbriæ are distended with decidual cells.

In many of the sections the decidual change is seen to be present in all the folds, in others a fold or a projection of one of the folds is seen to have escaped. The change is most marked on the uterine side of the gestation sac. The decidual formation in the mucous ridges of the intact portion of the gestation cavity represents the decidua vera, as found in the uterus.

The cells vary greatly in shape, some being round, oval or spindle shaped, whilst others are extremely irregular in outline. These differences would appear to be due in part to mechanical influences, and in part to the fact that the cells are cut across in varying planes. The cells consist of a greatly enlarged cell body composed of granular cytoplasm, staining lightly and uniformly with eosin, and of a nucleus, for the most part central in position, also enlarged, but not to the same degree as the cell body. The nuclei are round or oval, and, on comparison, are found to be somewhat smaller than those of the fully formed uterine decidual cells. Here and there the cell body has shrunken from the cell wall, probably in the process of hardening.

In some places, especially towards the free edge of the mucous projections, the cells are closely packed together, in other places they are separated from one another by distinct intercellular intervals (Plate B, Fig. 2). In these areas the cells are seen to be surrounded by, or imbedded in, a fine reticular structure which stains blue with hæmatin.

The decidual cells are best developed in the inner, expanded portions of the tubal folds, and, as the result of the levelling of the surface by the decidual growth, the characteristic arborescent appearance of the folds is frequently lost.

As already mentioned, a portion of a fold here and there towards the free edge is found to be unaffected by the decidual

change. In the attached margins of the folds, also, and in the mucosa between the folds, decidual formation to the same degree is absent. In these regions the cells may be swollen in a similar manner. They are, for the most part, however, unaltered in appearance.

Here and there, interspersed between the decidual cells, smaller cells, with darkly staining nuclei, are seen. Under high magnification they are seen to be connected with one another and with the decidual cells by fine branching processes. They resemble closely the unchanged stroma cells at the bases of the rugæ, to which they probably correspond.

Scattered amongst the decidual cells, also, leucocytes are to be seen, singly or, especially round the blood-vessels, in considerable numbers. They are, in the main, of the polymorphonuclear type. In places the blood-vessels in the mucous folds are seen to be crowded with leucocytes of this character.

Fig. 1, Plate B, represents a transverse section of the tube on the inner side close to the gestation sac. As in other parts, the folds are turgid with decidual cells. They are fused across the tube lumen in a complicated manner, and the sections might, at first sight, indicate that the cavity of the tube was in this way transformed into an open spongework. In places, however, where blood clot is present in the lumen, it is seen to exhibit indentations corresponding to the folds, which apparently have shrunk considerably in the process of hardening. This is well seen towards the right side of the figure. The appearances suggest that in the original condition the central portion of the tube cavity is almost entirely, if not wholly, obliterated by the swollen folds, and that in this way a more or less accurate counterfeit of the decidua compacta of the pregnant uterus is formed. The region at the periphery of the tube lumen corresponding to the narrower portions of the folds would represent the spongy part of the uterine decidua.

The fusion of the tubal folds is most marked in the neighbourhood of the gestation cavity, becoming less and less distinct as the sections are continued. It is absent in the tube external to the gestation sac. It corresponds to what is well known to occur in salpingitis. The epithelial cells covering the distended folds are flattened, and have, for the most part, lost their ciliated margin. In most places the epithelial covering is complete, and the cells have retained their normal-staining characters. In some regions there is evidence of a catarrhal process, though in none of the sections is this present to a marked degree.

The Muscle and Connective Tissue of the Tube Wall.—There is a well-marked œdematous effusion through the entire extent of the tube wall, being especially evident between the inner and outer muscular coats. In many places this has resulted in a complete detachment of the outer coat of muscle from the inner, circular layer. In most regions the muscle bundles are separated by distinct intervals from each other, and the component fibres may be detached from one another. In many places the fibres are broken up into longitudinal bundles of fibrils. Here and there the fibres are swollen and pale, with a large faintly-staining nucleus. In no part of the tube wall is there evidence of hypertrophy of the muscle. The intermuscular connective tissue cells are, for the most part, normal in appearance. Here and there cells with a large granular, faintly-staining cell-body and an enlarged, pale nucleus are seen. Apart from these, there is no evidence of decidual change in the muscular wall of the tube.

In most parts of the tube wall there is a distinct leucocytic increase, the cells being mainly of the polymorphonuclear type. Scattered about in the muscular coats there are areas of extravasation of red blood corpuscles, varying in size from a collection of two or three corpuscles to larger hæmorrhages. In all the sections examined of the tube on the inner side of the gestation cavity, and for some distance on the outer aspect, there is a large tract of extravasated blood towards the upper surface, which has led to a complete separation of the muscular coats from one another in this region. This blood tract increases in size as the gestation sac is reached, and here it is found to be continuous with an extensive area of blood extravasation. The blood is apparently derived from the site of the ovum bed, and has burrowed around and along the tube between the two muscle layers, in this way following the path of least resistance.

The Vessels of the Tube Wall.—There is well-marked hyperæmia in all the sections. In some of the vessels, especially in those towards the gestation cavity, there is proliferation of the endothelial cells. This is found, however, in some vessels even at a considerable distance from the ovum bed. In some of the smaller vessels in the tube wall towards the uterine end an interesting appearance is detected; the endothelial cells are swollen, the cell outlines have disappeared, and the nuclei are multiplied, resulting in the production of a syncytium-like mass. That this appearance is not due to the lodgment in the vessels of masses of syncytium carried from the ovum bed is proved by

tracing the sections in series, and finding that the lumen of the vessels is unoccupied by the plasmodium. There is no evidence, in any of the sections, of decidua-like cells under the endothelium. In many places the middle coat of the larger vessels is œdematous, leading to a separation of the muscle fibres. In the spaces thus produced red blood corpuscles and leucocytes may be detected. In other places, and this is present even at a distance from the site of the ovum, the softening process has led to a disintegration of the vessel wall in whole or in part, permitting of a wholesale extravasation of blood into the surrounding tissues. In some cases the intermuscular connective tissue cells of the vessel wall are swollen, but there is in none of the sections evidence of distinct decidual reaction in this region.

Decidual Reaction in the Peritoneal Endothelium.—In most of the sections the endothelium of the serous coat has almost entirely disappeared. In some locations, however, it is retained, and in these regions the cells are found to be markedly swollen, the cytoplasm stains faintly, and the nuclei are enlarged, possessing a chromatin network. The row of enlarged cells suggests the appearance of an epithelial surface. This change seems to be of the nature of a decidual reaction.

As already mentioned, the region of the tube wall corresponding to the ovum bed was too much damaged to permit of a study of the formation of a capsular membrane, or of the existence of decidual reaction in that region, in view of a fact which has been repeatedly demonstrated by other observers, namely, that to obviate the risk of confusing the maternal and fœtal cells it is necessary to study the cell relations by the aid of serial sections.

Case II.—This specimen (Fig. 2, Plate A) consists of a blood mole situated in the tube close to the fimbriated extremity: dimensions, 6 cm. long by 5 cm. wide. The surface of the mass is covered by flakes of partially organised blood clot. The lower aspect of the tube is recognised by the divided ends of the blood-vessels.

A longitudinal section of the mole reveals the fact that the centre is occupied by a relatively large amniotic cavity, about 3 cm. in diameter, on the outer and lower aspect of which there is seen a small embryo, attached by an umbilical cord, 7 mm. long. The embryo, which is well preserved, is 6 mm. in length and, therefore, corresponds to a development of about three weeks.

PLATE A.

FIG. 1.

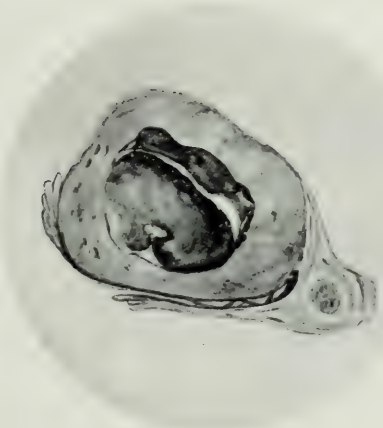

FIG. 2.

The circumference of the amniotic cavity is corrugated, corresponding to irregularities on the inner aspect of the blood mole. The amnion is detached in places, disclosing underneath a membranous structure which looks like the chorion. The section has divided the tube on the uterine side, which lies at the inner and lower aspect of the gestation sac.

On the upper aspect the mole is limited by layers of partially organised blood clot. In this region there is no evidence of tube wall, either macroscopically or microscopically. Extending along the lower surface of the mole the tube lumen is discernable, opening at the outer end in the fimbriated aperture. Separating the mole from the lumen is a fine membrane, which, on the inner aspect, becomes continuous with the tube wall, and on the outer aspect ends in the fimbriated termination which is stretched over, and adherent to, the outer pole of the tubal mole well beyond the level of the lower fimbriæ. At the inner pole of the blood mass the tube wall is distinctly visible, and is seen to extend up on to its surface for some distance, when it gradually disappears, being replaced by the organised blood clot already referred to.

Stretching across the tube lumen some delicate threads are seen; these represent tubal folds fused together. The tube lumen is found to be stretched out transversely across the lower surface of the mole. Here and there the two walls are adherent, and on endeavouring to separate them areas of blood clot are exposed. These regions correspond to parts where the trophoblast in its growth has invaded the opposite tube wall.

The appearances indicate that the embryo had developed primarily in the upper tube wall, the remains of which are stretched out as a "membrana reflexa." In the process the upper fimbriæ have been projected beyond the original site of the abdominal ostium. During its growth the ovum had burst its bounds on the upper aspect, but only gradually, and allowing time for the formation in this region of a wall of organising blood clot.

The study of the minute anatomy is facilitated by approaching it under the following headings:—

(1) The Mucous Membrane of the Pregnant Tube and Intramuscular Diverticula from this.

(2) The Muscular and Connective Tissues and the Vessels of the Tube Wall, especially with Regard to Decidual Formation.

(3) The Gestation Sac and the Fœtal Membranes.

(4) The Mode of Trophoblastic Invasion.

FIG. 1.—Section of tube showing on the right the villi imbedded in blood clot separated from lumen by the "capsularis" On the opposite tube wall, see complicated arrangement of epithelial-lined tracts.

PLATE B.

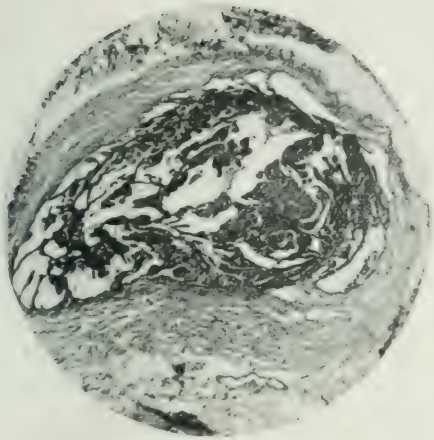

FIG. 1.

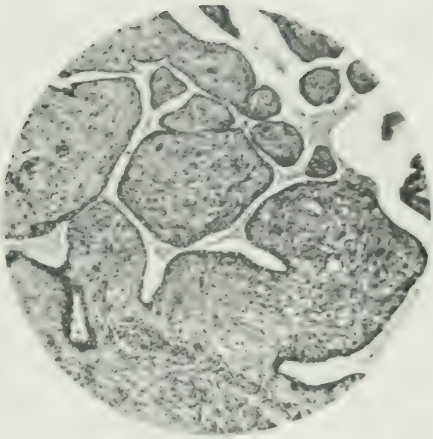

FIG. 2.

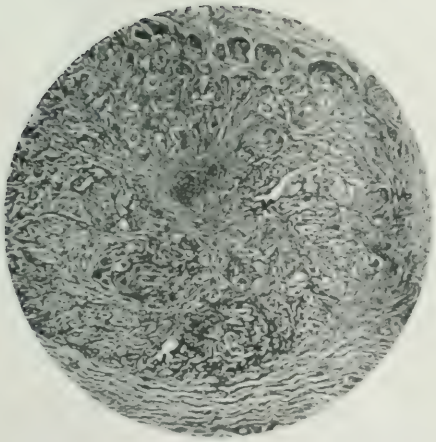

FIG. 3.

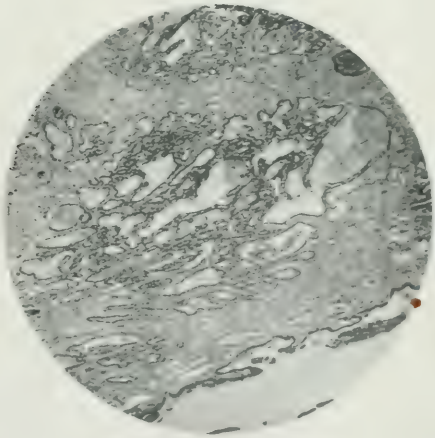

FIG. 4.

The Mucous Membrane of the Pregnant Tube.—Towards the uterine end of the divided tube transverse sections reveal the fact that the lumen is distinct. Here there is well-marked fusion of the mucous folds, such as is seen in some cases of salpingitis: as a result of this the periphery of the tube lumen is transformed into a cribriform structure. As the lumen is traced towards the gestation sac an interesting appearance is discovered. The fusion of the mucous ridges is found to have taken place to an excessive degree, and the tubal lumen is transformed into a sponge-like structure, presenting on transverse section the appearance of a fine sieve or of a closely woven network (Fig. 3, Plate B). The minute meshes of the sponge are lined by a layer of cubical or columnar epithelium, in parts swollen and degenerated. The spaces are occupied by blood corpuscles and desquamated epithelial cells.

This condition was first described by Werth.[1] and has since been noted by several observers. That it is of considerable rarity is indicated by the fact that Whitridge Williams[2] in his series of cases of tubal pregnancy has encountered it only once.

As the sections of the tube were pursued the remarkable appearance represented in the figure in the text was revealed (Fig. 1). On the right is seen the region of the ovum bed separated from the tube lumen by the distinct capsular membrane. There is fusion of the mucous folds across the lumen. On the opposite tube wall there are seen five areas composed of an exceedingly complex arrangement of epithelial lined spaces, one of which (the uppermost in the figure) is seen communicating with the tube lumen. This area in serial tracing is found to be continuous with the tube lumen on the uterine side.

In all of these regions the intricate arrangement is due to the fact that the epithelial lining is raised into numberless folds, many of which have fused with neighbouring projections. In addition to the overgrowth in the shape of papillary projections into the spaces, the epithelium has strayed into the surrounding tissue in the form of diverticula of varying size (Fig. 4, Plate B). In some places these spaces are found by tracing them in series to have been cut off from the main tract and to have formed cystic cavities of different dimensions. In some locations, also, we find

[1] *Beiträge zur Anatomie und zur operativen Behandlung der extrauterin-Schwangerschaft*, Stuttgart, 1887.

[2] *Gynecology and Abdominal Surgery*, Kelly and Noble, 1908, vol. ii. Article on "Extra-uterine Pregnancy," p. 149.

that epithelial plugs devoid of a lumen have been projected into the tissue of the tube wall and into the stroma of the papillæ, suggesting the appearances presented in a malignant condition. In the tube wall forming the "capsularis," epithelial diverticula, similar to the off-shoots from the main tracts described above, are to be found.

As the sections are traced the two lower spaces adjacent to the tube lumen proper are seen to open into this in a manner similar to that described in connection with the upper. The two outer spaces are found to communicate with the other tracts by epithelium-lined channels of a complex nature, and thus to establish a connection with the tube lumen.

The *epithelium* lining the true lumen of the tube is of the ordinary cylindrical type, with, in most places, a distinct ciliated margin. The cells are arranged one row deep, with the nuclei basal in position. In some places the cells are cubical or flattened, and may be swollen and degenerated. In the epithelial lined spaces the cells are more irregularly arranged, and are, for the most part, cubical or flattened. In many places they are several rows deep, and here and there they are heaped up to form papillary projections, into the larger of which the stroma is drawn. These appearances strongly suggest the existence in the cells of an increased reproductive activity. In areas the cells are degenerated, and may be desquamated; the ciliated margin is, for the most part, lost. Where the epithelial projections become apposed they tend to coalesce. In some places the process of fusion would seem to be demonstrable: the cell outlines become obscured, the cell-bodies, as it were, flow together, and, along with this, there is a multiplication of the nuclei. A syncytium-like mass is thus produced, cementing together the apposed projections (Fig. 1, Plate C). In other places, in the course of the continuous tissue bridges traversing the space, there is found a patch where the cells of the stroma are larger, more closely packed together, and resembling the epithelial cells in structure. These would seem to correspond to sites of fusion. In the course of time these cells are probably replaced by normal stroma cells.

In places where the epithelium-lined tracts are narrow and the cells of each side are close to one another there is seen the same tendency to the fusion across the lumen of the cell-bodies.

The stroma cells of the projections are, in most places, normal in appearance. Here and there isolated decidua-like cells are seen, with a greatly enlarged cell-body and a large nucleus

possessing a distinct chromatin network. In the stroma there is well-marked leucocytic infiltration; the cells are chiefly of the mononucleated type. They have migrated through in numbers into the free spaces, and, with red blood corpuscles, lie imbedded in a faintly-staining homogeneous matrix.

In an endeavour to interpret the appearances above depicted serious difficulties are to be encountered. The explanation of the "findings" would seem to fall into one or other of two headings, namely—(1) that the tube is convoluted in an intricate manner and that in the sections we are catching the tube lumen at different parts of its course; or (2) that the condition is due to an adenoma-like proliferation of the tubal epithelium.

The former explanation is rendered unlikely by the extreme intricacy of the epithelium-lined tracts and by the fact that these have wandered as definite diverticula into the surrounding muscle. In some places the diverticula have been cut off from the main tract. This interpretation is also invalidated by the fact that the portion of the tube wall forming the "capsularis" is beset with similar diverticula in all the sections examined; in some cases these extend right up to the region of the ovum bed. That the condition is due merely to a convoluted state of the tube is also negatived by the course which the lumina are found to pursue in tracing by serial sections, and also their relation to the lumen proper. It seems to me that the appearances can be interpreted rightly only by assuming a hyperplasia of the mucous lining of the tube of an adenoma-like nature.

The existence of diverticular offshoots from the mucous membrane has been repeatedly described in pregnant and other tubes, and within recent years the condition has assumed a position of primal importance in relation to the causation of tubal pregnancy. The specimen here described is endowed with an additional interest, from the fact that it presents a second pathological state held to play an important part in the production of tubal pregnancy, namely, fusion of the mucous folds.

The etiology of intra-muscular diverticula from the tubal mucosa is still in dispute, and to the elucidation of the problem the case under discussion contributes little of importance. By some observers, notably Werth,[1] the presence of small mucous branchings is traced to the influence of the growing ovum. The existence of the condition to such an extensive degree, in association with an embryo only a few weeks old, would

[1] *Vide* Report of Würzburg Congress, *Zentral. f. Gyn.*, 1903, No. 28, S. 850.

seem to render this explanation inapplicable to the case under discussion. The possibility, however, that there had been a proliferative change in the epithelium previously existent, which had been excited to greater activity subsequent to the ingrafting of the ovum, must not be overlooked. This is supported by the evidence in many places of well-marked cellular growth.

The presence of epithelial hyperplasia of the mucosa of the non-pregnant tube has been explained in varying ways by different observers. By von Recklinghausen it is supposed to be a congenital condition; by others, and this seems to be the predominating idea in the literature, it is traced to a pre-existing salpingitis. Stein[1] considers it due to tubercular or gonorrhœal infection, whilst others, more especially Meyer,[2] consider that a salpingitis from whatever cause may be the etiological factor. Hoehne[3] has described a case in which a small tubal diverticulum had been caused by the rupture of an intra-mural abscess into the lumen, the walls of which had subsequently been clothed by the spread of cylindrical epithelium from the mucous membrane. Orthmann[4] has described a non-pregnant tube, presenting, in a less degree, the characters described in the specimen under discussion, and Neu[5] has put on record a case of multiple diverticula from the tube lumen in a tube left behind in vaginal hysterectomy for cervical fibroid. The condition he considered as due to an inflammatory process.

Fusion of the Mucous Folds.—This is present to a marked degree through the entire extent of the tube, reaching its maximum on the inner side of the gestation sac. Whether the condition is primary or is secondary to the ingrafting of ovum it is impossible to determine definitely, though the fact that it has

[1] "Ueber adenomatöse Wucherungen der Tubenschleimhaut bei chronischer Tuberkulose und Gonorrhöe der Tuben. Sep.," *Abdr. aus Monatschr. f. Geb. u. Gyn.*, Bd. xvii. (Ergänzungsheft), S. 4.

[2] "Ueber adenomatöse Schleimhautwucherungen in der Uterus—und Tubenwand und ihre pathologisch-anatomische Bedeutung," *Virchow's Arch.*, Bd. clxxii. S. 394 ff.

[3] "Zur Frage der Enstehung intramuscularer Abzweigungen des Tubenlumens," *Archiv. f. Gyn.*, 1904, Bd. lxxiv. S. 1.

[4] "Zur Kenntnis der malignen Tubenneubildungen," *Zeitschr. f. Geb. u. Gyn.*, Bd. lviii. S. 409.

[5] "Ueber entzündliche Schleimhautwucherung mit epithelialer Mehrschichtung in der Tube—(adenomähnliche Wucherungen bei einer nach Vaginaler Totalextirpation prolabierten Tube)," *Zeitschr. f. Geb. u. Gyn.*, 1908, Bd. lxii. S. 489. (For a *resumé* of the recent literature the reader is referred to this article.)

PLATE C.

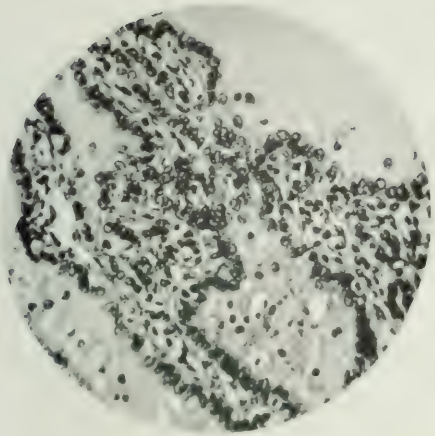

FIG. 1.

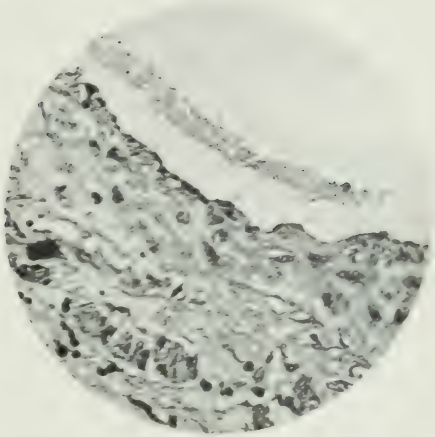

FIG. 2.

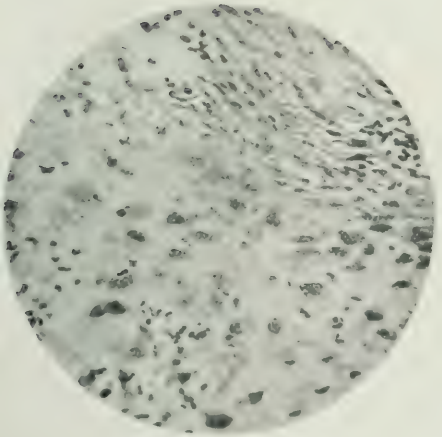

FIG. 3.

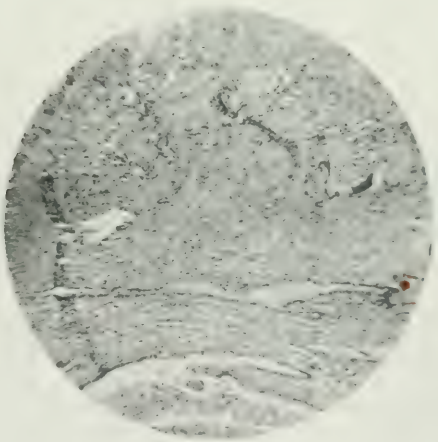

FIG. 4.

reached such a stage of completion is not inconsistent with the former interpretation. On the other hand, the discovery in places of the process, as it were, caught in the act, would indicate that it had continued during the pregnancy.

The evidence so far accumulated, though at best only of a circumstantial nature, would seem to warrant the conclusion that the fertilised ovum had become lodged in a diverticulum in the upper portion of the tube wall. As described, such diverticula were detected extending right up to the ovum bed. The complex fusion of the mucous folds across the tube lumen may have played a part in preventing the free passage of the ovum along the normal course, in this way increasing the chances of its being carried by ciliary action, or muscular activity of the tube wall, into one of the diverticula.

Changes in the Vessels of the Tube Wall.—There is well-marked distension of the vessels in all parts, being especially evident in the neighbourhood of the ovum. The endothelium is in many cases swollen, and may be shed into the lumen. In none of my sections is there definite evidence of endothelial proliferation. The middle coat of the vessels is in many places œdematous, producing on section a vacuolated appearance. As the ovum bed is reached the middle coat is apt to be infiltrated with red blood corpuscles. Round a large number of the vessels there is distinct emigration of leucocytes, chiefly of the mononucleated type. In many areas there is extravasation of blood corpuscles into the tissues; this reaches its maximum in the neighbourhood of the trophoblast.

The chief interest of this case in this connection lies in the opportunity it affords for the study of decidual formation in the vessel walls. To eliminate the risk of confusion between maternal and fœtal cells, the vessels selected for investigation are, in the main, from the tube wall opposite to that occupied by the embryo and at a distance from the trophoblastic line of advance. To obviate still further this risk the vessels have, in each case, been traced in serial section.

In many of the sections there is the formation of large oval, round or spindle cells immediately under a normal endothelium. The cytoplasm is granular, the nucleus is vesicular, is round or oval, and possesses a distinct chromatin network (Fig. 2, Plate C). They are found singly or in clumps. They correspond closely to similar cells found between the muscle bundles of the vessel wall, and whose presence is associated with a certain amount of dis-

placement and degeneration of the muscle. They resemble in size and structure the typical decidual cell, and are unlike the trophoblastic cells of Langhans' layer in being much larger and less uniform in shape. Another fact which seems to me to be of some importance in precluding the possibility of their being fœtal in origin is, that in their neighbourhood there is not the evidence of destruction invariably encountered in the proximity of the trophoblastic cells—the endothelium is intact, and the muscle cells, though compressed and in some places degenerated, are still recognisable as such.

In other places the sub-endothelial region is transformed into a honeycomb-like arrangement, the meshes of which are formed by the branching processes of large cells of a similar nature to those described above. The endothelial lining is present. In one of the vessels examined the latter appearance was detected on one wall, whilst on the opposite wall large cells, of the above-mentioned type, closely set together, were present under the endothelium. The interpretation of these appearances is not clear, but it seems not improbable that the vacuolated condition is due to a degeneration of the large decidua-like sub-endothelial cells. In some of the vessels large heaped-up masses of these enlarged connective tissue cells were found between the muscle and the endothelium, leading to a narrowing of the vessel lumen.

In the sections of a vessel in the opposite wall of the tube near a region attacked by the trophoblast a condition of interest was seen. The normal structure of the wall is replaced by the presence of a homogeneous granular material, staining deeply with eosin, in which there are imbedded large cells of varying sizes, with faint and irregular outlines, and staining like the surrounding material. The nuclei are large and stain deeply with hæmatin. These appearances coincide with structural changes in the tube wall in the neighbourhood of this vessel: these will be described in the following section of the paper. In these vessels the endothelium is lost and some of the innermost cells project, partially detached, into the vessel lumen.

The changes in the vessels in the immediate vicinity of the trophoblastic line of advance, and the relation of the fœtal cells to the vessel walls, will be described in a later section.

The Muscle and Connective Tissue of the Tube Wall.—There is well-marked œdema and leucocytic emigration in all parts of the tube wall, reaching their maximum in the neighbourhood of the ovum bed. Here and there areas of extravasation of blood into

the tissues are found. In most of the sections examined there is fibrinous degeneration of the muscle, which reaches an extreme degree in the vicinity of the trophoblast.

In no part of the tube were there evidences of decidual formation to the extent occurring in the uterine mucosa during pregnancy, or to the extent present in the mucous folds in the last specimen. On the opposite wall of the tube, and to a less degree in the "capsularis," there are, however, cells of a character resembling decidual cells. In all the sections examined these are recognised as large, oval, or spindle cells scattered about irregularly in the degenerating muscle; the nuclei are enlarged, vesicular, and stain faintly with hæmatin. They are, without doubt, altered connective tissue cells.

In a part of the opposite wall, immediately in advance of the trophoblastic line of attack, a peculiar alteration in structure is seen, similar to the changes found in the walls of one of the vessels described above. The muscle cells have lost their outlines, and seem to have fused together to form a homogeneous, eosin-staining matrix, in which large cells staining similarly are imbedded. The cell bodies are of varying contour and size, and the cell outlines are obscure; the nuclei are large and stain deeply. The cells are separated by distinct intercellular intervals, and they would seem to correspond to altered intermuscular connective tissue cells (Fig. 3, Plate C). This is the nearest representation of the uterine decidua detected in this specimen.

The appearance observed in this region was recognised in all the sections of the tube wall, including the site of the fœtal invasion. Where the sections are cut in a plane coinciding with the direction of the villous advance, the condition is represented by a narrow tract of the uniformly staining medium, in which the enlarged and irregularly shaped decidua-like cells are imbedded. This lies immediately apposed to the advancing trophoblast. The sections indicate that, by the influence of the fœtal cells, probably traceable to the bio-chemical activity of the liberated enzyme, a fine "decidual sheet," in which the embryonic structures are enwrapped, is formed from the maternal tissues. The appearance represented in Fig. 3, Plate C, which is present over a comparatively large area, is apparently due to the fact that this maternal sheet has been cut across in a tangential manner, thus exposing a greater surface in the section. Here and there islands of chorionic cells are dotted over the section, indicating the points where the fœtal attack has broken through.

The markedly differing degrees in which the "decidual sheet" is exposed in the same specimen, according to the direction in which the sections are made, may partly explain the great divergence of opinion expressed in the literature of the subject on the extent of the decidual change present in the region of the ovum bed.

The structure of the tube wall would seem to preclude the possibility of a decidual formation to the extent found in the

FIG. 2.—In upper part see amnion and chorion, from which villi project into blood-clot. In lower part tube wall shown—here a number of mucous diverticula are present. Near tube wall two spaces visible where blood is unclotted—here villous tips well nourished.

uterine mucosa, where the production of the decidual membrane is accomplished by the enlargement of the stroma cells, which are densely packed together to form a uniform layer of considerable thickness. Many observers have seen, in the insufficiency of the defensive barrier of decidual cells laid down in the tubal wall, a reason for the extensive and uncontrolled destruction associated with the development of the ovum in this region.

The Gestation Sac and Fœtal Membranes.—The fœtal membranes, as already mentioned, are surrounded by a layer of blood

clot of considerable thickness. This, in its turn, is enclosed below and at either pole by the attenuated tube wall, which, in the region beyond the placental attachment, represents the "capsularis." On the upper aspect the mole is limited by blood clot, denser in consistence, and in which there is partial organisation.

This specimen, in which the relations of the fœtal structures are not greatly disturbed, is of value for the study of the site of the haemorrhage in the mole. In sections taken from various regions round the circumference of the amniotic cavity, the amniotic epithelium, detached in places from the underlying connective tissue, is seen. External to this the chorionic epithelium is recognised as a sharply defined line. The cells are markedly degenerated, the protoplasm is transformed into a faintly staining material, and the nuclei are granular and stain lightly. Projecting outwards from the chorionic surface numerous villous stems are to be recognised, imbedded in the blood clot. In all the sections examined the blood forming the mole is found to be situated on the outer aspect of the chorion—in no place was there any blood lying between the amnion and chorion (Fig. 2). These findings are of importance in showing that the blood forming the tubal mole is not necessarily situated in a so-called "sub-chorionic chamber" (Bland-Sutton[1]). Here and there in the immediate vicinity of the villi nucleated red blood corpuscles are present. The main mass of the blood clot, however, is formed by maternal red blood cells. These facts negative the statement that in the production of the tubal mole the fœtal blood takes the larger share.

Round the entire circumference of the chorionic membrane, with the exception of the placental site, the villi are found to be distinctly degenerated. The degenerative process involves both the epithelial covering and the underlying stroma; in some places the villi are represented merely by fibrinous cords (Fig. 2). In some of the villi remains of the vessels are seen, containing disintegrating nucleated red blood corpuscles.

Fig. 2 in the text shows a photograph of a section through the mole, including the amnion and chorion and portion of the tube corresponding to the "membrana capsularis." Here, as elsewhere, the villi, in various stages of degeneration, are found imbedded in the blood clot. The villous degeneration is more marked the nearer the chorionic membrane is approached. The blood clot is more and more recent as the tube wall is reached, and the appearances suggest that the mole had been formed by a gradual

[1] *Diseases of Women*, Bland-Sutton and Giles, 6th edition, 1909, p. 304.

ooze of blood as the villi in their growth invaded and opened up the tubal vessels.

Towards the tube wall an interesting appearance is presented. Here there are small areas in the mole where the blood has not clotted, and it is found that, where the villi project into these spaces, their epithelial covering and stroma retain their normal characters. The epithelium is represented by cubical cells several layers deep resting on the connective tissue core. The cells are set close together; the nuclei are large, mostly central in position, and possess a well-marked chromatin network. In places they project from the villus in distinct clumps. In most places the surface of the villus is provided with a plasmodial covering with numerous deeply staining nuclei. In some regions this is seen, as it were, to flow from the villus as a fine lining sheet round the fibrin-walled blood spaces. These appearances are well shown in Fig. 2, Plate D, where the degenerated villus at its tip is seen to project into such a blood space.

The above description would indicate that the blood from the opened tubal vessels is poured out into the extra-chorionic space in excess of the preparations made for its removal. It clots, except in the neighbourhood of the gaping vessels, where the circulation is maintained to a degree sufficient to nourish portions of the villi. By tracing through serial sections vessels can be detected opening into the spaces.

These observations indicate that under favourable circumstances the distal portion of the villus may survive subsequent to the death of the chorionic end. As will be described in a later section the surviving portion may actually retain its power of growth and invasion of the maternal tissues. From analogy it would seem not unlikely that under propitious conditions the placenta may, in part at least, continue to develop after the death of the fœtus as suggested by Gubb[1] and others.

The appearances depicted demonstrate the well-known parasitic nature of the chorionic epithelium, and prove that the villus is independent of the fœtal circulation, relying on the maternal blood for its nourishment. The fact that the stroma cells in the villi concerned have retained their normal structural characters would tend to invalidate the conception that the connective tissue core of the villus is necessarily dependent on the fœtal circulation for its nourishment. These facts, also, have a certain bearing in relation

[1] "The Placenta in Ectopic Gestation and its Growth after the Death of the Fœtus." *Med. Press and Circular*, 1894, lvii. p. 326.

to the theory advanced to explain the origin of hydatidiform degeneration of the chorion on the ground that, with obstruction of the villous vessels, from thrombosis following the death of the fœtus or from other causes, the fluid, which is, as it were, passed back by the epithelial cells from the maternal blood, leads to inflation and vesicular degeneration of the villi. In this specimen we have these conditions fulfilled, and yet in none of the sections is there evidence of œdematous distension of the villi.

In this section it must be noted that the portion of the tube wall separating the ovum bed from the tubal lumen or the *membrana capsularis* (Fig. 4, Plate C) is complete in all the sections. It consists of a layer of fibrin, muscle and connective tissue showing advanced fibrinous degeneration, and is lined on the inner aspect by a layer of cubical or columnar epithelial cells, which in places are swollen up and degenerated. The connective tissue cells are here and there increased in size, with a large clear nucleus, and closely resemble decidual cells. From the tube lumen numberless epithelial-lined tracts make their way into the substance of the "capsularis," and in some places reach right up to the region of the ovum bed. These constitute part of a system of intra-muscular epithelial diverticula described in a previous section.

Method of Trophoblastic Invasion.—This is well studied in sections of the gestation sac, including the tube wall, and conforms with what has been repeatedly noted by other observers. In advance of the actual cellular invasion the muscle bundles become separated by œdema, the fibres swell up and lose their staining properties to a large extent, and the nuclei become enlarged and feebly staining. The connective tissue cells in many places enlarge in a manner resembling the uterine decidual cells. In many regions, especially in the neighbourhood of the vessels, there is an escape of leucocytes into the tissues of the tube wall, mainly of the mononucleated variety. As the ovum bed is reached the muscle and stroma cells lose their outline and are represented merely by a fibrinous structure in which disintegrating nuclei are to be detected. In this specimen these changes are evident even at a distance from the advancing trophoblast. As usually explained, they are due to the bio-chemical influence of an enzyme liberated by the cells of the chorionic epithelium and diffused by the lymph or blood tracts.

In the immediate vicinity of the invading trophoblast the cells are seen to have engrafted themselves *en masse* on to the maternal tissue, with which they are more or less incorporated (Fig. 1,

Plate D). In other areas they are advancing by excavating the maternal structures, and lie free in bays formed in the tube wall. In other regions the trophoblastic progress is manifested by an infiltration from the general villous mass of isolated cells and syncytial buds.

In some of the sections the relation of the fœtal cells to the maternal blood-vessels is well seen. In some cases the ectodermic cells are detected infiltrating and eroding the vascular wall from without (Fig. 1, Plate D), in others they are seen extending along the inner aspect of the opened-up blood-vessel. Whether this latter appearance is or is not a later stage of the former the sections do not demonstrate. The changes in the vessel walls of a decidual nature have been described in a former section of this paper.

Internal Rupture of the Tube Wall.—In several of the sections, including the portion of the tube wall forming the "capsularis," there is evidence of rupture into epithelial-lined off-shoots from the tube lumen, where these lie in the line of the advancing trophoblast. In one of these spaces selected for description it is seen that the epithelial cells on the side corresponding to the invading trophoblast have in part disappeared, permitting an escape of blood into the lumen. This space lies well in front of the actual trophoblastic cellular invasion. The tube wall in this region has undergone fibrinous degeneration, and is infiltrated extensively with blood. The epithelial cells towards one side, with the exception that they are somewhat flattened, have retained their normal structure. As the epithelial layer is traced along it is found that the cells become enlarged and pale, and the nuclei become swollen and stain feebly. Still further along the cells disappear entirely, corresponding to the site of rupture. The appearances suggest that the rupture is not merely of a mechanical nature, but has been preceded by a degenerative softening process, probably traceable to the chorionic enzyme.

This rupture into epithelium-lined projections of the tubal lumen is recognised in several regions. The specimen, then, is of interest as showing rupture of the tube wall both on the peritoneal and on the mucous aspects, and in neither case has the rupture been sufficient to lead to a dislodgment of the growing embryo from the tube wall. It is of interest to note that neither of the sites of rupture corresponds to the placental area.

As already mentioned, in several places the opposite tube wall has become adherent to the wall forming the gestation sac, and has become subsequently invaded by the fœtal cells.

PLATE D.

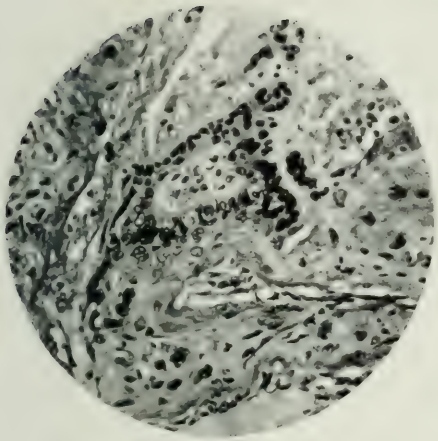

FIG. 1.

FIG. 2.

Large lumen.

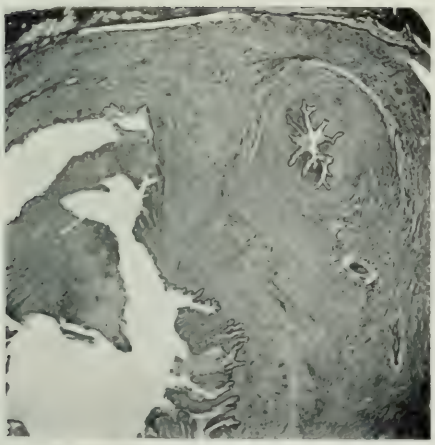

FIG. 3.

Small lumen.

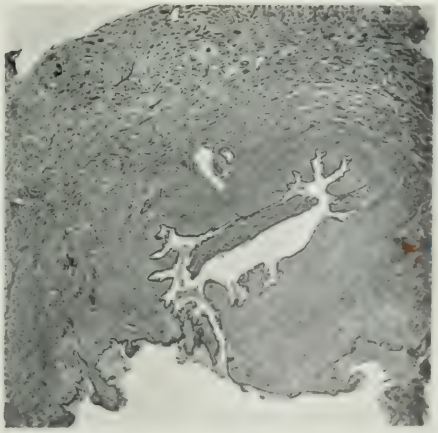

FIG. 4.

Case III.—The next specimen consists of the right tube, the ampullary portion of which is markedly distended. The peritoneal surface is covered with flakes of fresh lymph and blood clot. Round the fimbriæ, which are somewhat retracted into the tube lumen, some fresh blood clot is seen. The abdominal opening admits a probe with ease. The dimensions of the distended tube are 6·5 cm. long, 4 cm. deep, and 5 cm. wide.

On longitudinal section it is seen that the tube is distended by blood clot, which in parts, especially on the upper aspect, has stretched out the tube wall to the thinness of paper. There is hæmorrhage into the tube wall on the upper and outer aspect. There is no evidence of lamination of the blood clot. Towards the outer and the lower aspect of the section a pale area is seen with fragments of what look like embryonic membranes.

On detaching the upper portion of the tube wall and lifting it up the tubal folds are seen, standing out as distinct ridges, and suggesting the appearance of the inner surface of the dura mater with the branching meningeal vessels. Microscopic examination of sections removed from the pale area on the lower and outer aspect of the blood mole reveals the presence of numerous degenerated villi imbedded in blood clot. There was no evidence of embryonic structures in several sections taken from the blood clot beyond this area, nor in any part of the tube wall. The appearances suggest that the embryo had been extruded into the tube lumen by a process of abortion, and had been, as it were, swamped by the attendant blood effusion.

The special interest of this case lies in the structural conditions found in the tube on the uterine side of the gestation sac. On external examination it is seen to be markedly thickened, and to curve forward and slightly inwards to the divided uterine end. On making a series of sections of the tube tranversely to its long axis, to the naked eye a single lumen, gradually narrowing to dimensions of 6 mm. by 4 mm., was encountered. It was distended with blood clot, and was obviously continuous with the cavity of the tubal mole. As the sections across the tube were continued, it was found that lying beside, and on the inner aspect of the distended lumen, there was a very much narrower lumen. As the sections were still pursued the blood-distended lumen was seen to stop abruptly, whilst the narrower lumen was found to be continued into the divided uterine end of the tube. Fig. 1, Plate E, represents in a diagrammatic form the conditions found.

By transforming the portion of the divided tube, showing at

one end the large single lumen, and at the other end the two lumina, into an unbroken series of microscopic sections, the line of junction between the two canals was discovered. This was found to consist of a narrow channel turning abruptly from the fine lumen and opening by a small aperture into the larger canal. (Figs. 3 and 4, Plate D.)

It will be noted that the larger channel ended abruptly, in fact, that it consists of a *cul-de-sac* or diverticulum. No other communication between the two lumina than the fine channel described was found in any of the sections.

The approximate lengths of the different parts are as follows:—

From inner end of mole sac to uterine end of divided tube = 4 cm.

From sac to junction of two portions = 2 cm.

From sac to end of diverticulum = 3 cm.

Therefore length of diverticulum = 1 cm.

It will be noted that the larger channel and diverticulum were distended with blood clot, whilst the small channel and cross connection present a narrow lumen, in which there is discoverable here and there only a trace of blood. The rationale of this is understood by reference to the microphotograph showing the aperture of communication between the two portions; this is seen to be narrow and apparently almost occluded by two mucous folds. (Fig. 4, Plate D.)

The findings suggest, therefore, that the stenosed aperture acted as a barrier to the passage of the blood, which, in all probability, was poured out at a comparatively high pressure.

It should be mentioned that there was no evidence of villi in the wall of the large lumen or the diverticulum. Reference to the figures shows that the increase in thickness of the tube on the inner side of the blood sac is due to an excessive production of muscular tissue. Each of the tube lumina is surrounded by a complete investment of muscle. On the outer and upper aspect of the larger canal this is, in places, reduced considerably in thickness. In many of the sections there is a well-marked œdematous effusion into the substance of the tube wall. This is especially evident round the blood-vessels, and, in places, has led to a ploughing up of the muscle bundles. In many regions there is an emigration of leucocytes in the neighbourhood of the smaller vessels; the cells are, in the main, of the polymorphonuclear type.

PLATE E.

FIG. 1.

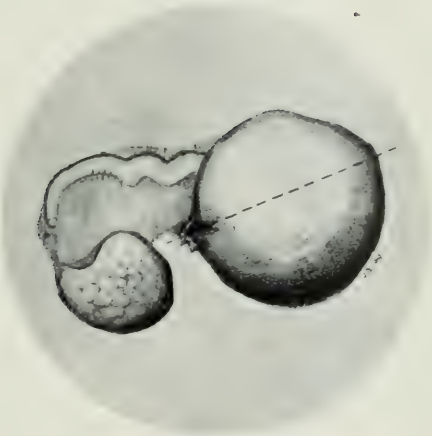

FIG. 2.

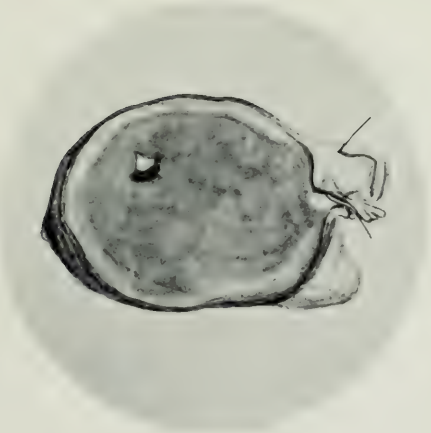

FIG. 3.

The epithelial lining of the tube canal and of the *cul-de-sac* is complete in all the sections. The cells are, for the most part, swollen up and degenerated, and have lost their ciliated margin. In no place is there fusion of the tubal folds.

The existence of diverticula in the pregnant tube of the nature discovered in this case, extending along for a considerable distance and overlapping the unaltered portion of the tube, has been described by several observers. In some cases it has actually been demonstrated that the fertilised ovum had entered the *cul-de-sac*, in the wall of which it had developed. Such cases have been described by Kroemer[1] and von Franqué and Garkisch.[2]

The appearances presented by the specimen in this series suggest that the ovum had been lodged from the beginning in the ampullary portion of the tube, and, by a process of internal rupture, had escaped into the tube lumen, in which its fragmented remains were discovered imbedded in blood clot. Some of the blood extravasated into the tube lumen by the rupture had passed inwards, leading to a marked distension of the *cul-de-sac*. The narrowness of the aperture of communication between the two parts of the tube lumen had prevented almost completely the passage of the blood into the uterine portion of the tube. The importance of these findings will be further discussed in the section at the end of the paper treating of the etiology of tubal pregnancy, as illustrated by the cases of the series.

Case IV.—*Tubal Mole showing Unusual Characters.*—This specimen (Fig. 2, Plate E) consists of a blood mole in the outer extremity of the right tube: dimensions, 5 cm., by 4·5 cm., by 4 cm.

The tube on the inner side of the blood cavity was freely convoluted, and could be seen extending along the inner aspect, apparently unaltered, to the fimbriated end, which is situated on the inner side of the sac. In the natural state the fimbriated end was overlapped and concealed from view by the distended portion of the tube, which, for the purpose of clearer demonstration, has been pulled outwards in the production of the drawing. The fimbriæ corresponding to the region of the blood sac are withdrawn into the lumen of the tube, so that their tips only are

[1] "Untersuchungen uber die tubare Eieinbettung," *Archiv. f. Gyn.*, 1903, Bd. lxviii., S. 85.

[2] "Beitrage zur ektopischen Schwangerschaft," *Zeits. f. Heilkunde*, 1905, Bd. xxvi., H. 9.

seen. The fimbriæ corresponding to the apparently unaltered portion of the tube are distinct. The abdominal ostium is patent.

The condition is an unusual one, and the true relations were not discovered till a section was made through the plane represented in the figure by the dotted line, and passing through the centre of the fimbriated opening. The appearances revealed are shown in Fig. 3, Plate E. The tube in the outer part is seen to be greatly distended by blood clot, and on the right and upper aspect of the drawing it is seen to extend in a distinctly convoluted manner towards the inner side. Below this is seen the fimbriated opening. By tracing the tube lumen it is seen to extend into the inner aspect of the cavity of the blood sac and thence to the abdominal ostium. The bristle indicated in the figure shows the original course of the canal of the tube.

The dissection shows that, in the formation of the mole cavity, one portion of the tube wall has taken by far the greater share. The condition closely resembles the mode of formation of a sacculated aneurism. The giving way of the one wall in this manner seems to depend on the convoluted state of the tube immediately on the inner side, reference to the figure showing how the undisturbed part of the tube wall would, in the event of a distending force acting from within, be supported by this part of the tube which is, as it were, buttressed against it. It will be noted that the distended portion of the tube is greatly thinned out right to the abdominal ostium, and the drawing shows that the fimbriæ corresponding to the mucous folds of this part are retracted within the lumen. By reflecting the tube wall in this region from the contained blood clot it is seen that, even where the muscular coat is reduced to the thickness of a fine membrane, the mucous ridges persist as distinct bands.

Towards the upper and left aspect of the section a small cavity in the blood clot with an irregular contour is seen; in the area immediately surrounding this a number of degenerated villi were discovered. No embryonic remains were detected in any other region.

As shown in the figure, the tube on the inner aspect of the blood cavity is markedly convoluted, and in cutting sections of a part including a twist, an appearance worthy of note was encountered. At one part the sections reveal three tubal lumina in a row, the central of which is smaller than the other two. By tracing successive sections the central lumen is seen to enlarge and to become continuous on either side with the two lateral

portions of the tube. As the sections are still further traced the tube lumen is seen to be represented by an elongated canal. These appearances are in all probability due to the fact that the sections are carried across a portion of the tube which is convoluted, the central "lumen" corresponding to an additional, smaller bend in its course. Kroemer,[1] in describing a specimen of tubal pregnancy, states that he encountered this appearance in the non-pregnant tube, which was removed at the time of the operation. He affirms that in his case the central lumen corresponded to a fine canal which, at each end, communicated with the main channel of the tube. He further states that he considers that the constriction produced in this way in the course of the tube lumen might predispose to the development of a tubal pregnancy.

In another part of this tube on the uterine side of the blood sac, the tube lumen was found to become markedly constricted, and on tracing it along it was found to expand gradually on the inner side to the normal dimensions. The narrower portion of the tube is found to possess a markedly thickened coat of circular muscle. The mucosa is somewhat thickened, and there is fusion of the folds across the lumen. The possible etiological relationships which these conditions bear to the development of the pregnancy in this case will be discussed in a later section.

Case V.—*Tubal Mole on Right Side with Hydrosalpinx on Left Side.*—In this specimen the outer portion of the right tube is the seat of a blood mole 6 cm. in length and about 3 cm. in diameter at its widest part. There are flakes of fresh lymph adherent to the peritoneal surface. The fimbriæ are surrounded and almost concealed by a pseudo-cyst formed by organising blood clot; this has been ruptured in the process of removal. On opening up the cyst more widely the fimbriæ are seen distinctly retracted and bunched together within the abdominal ostium. The opening admits a probe with ease. The tube on the uterine side of the mole is slightly convoluted and is distended, more towards the mole cavity and diminishing in diameter as the uterine end is approached.

On making a transverse section in the region of the mole, the wall of the tube is seen to be thinned out, and in places, especially on the upper aspect, is reduced to a mere film by the accumulation of the blood within the lumen. On tracing the tube canal it is seen to contain blood right to the divided uterine end. In the greater number of the sections this is easily recognised by the

[1] *Vide supra.*

naked eye; towards the narrower uterine end the blood is recognised on subjecting the tube to microscopic examination.

On turning aside a flap of tube wall from the surface of the mole it is found that the mucosa and the inner coat of muscle can be separated with unusual ease as a continuous membrane from the subjacent external muscular layer. The mucous folds in most places remain distinct. Traces of villi were discovered in the blood clot towards the outer end of the tube.

Hydrosalpinx on the Left Side.—The tube on the left side is transformed into a hydrosalpinx of the usual type. The abdominal ostium is closed and somewhat dimpled. The ampullary portion is greatly distended, the wall being reduced to a fine semi-transparent membrane. The distension of the tube gradually diminishes as the isthmal portion is reached. The isthmus is convoluted three times. On pressing the distended tube gently the fluid is expressed from the divided uterine end as a small clear stream.

It is interesting to note that there are points of distinct resemblance between the conditions in the two tubes. On one side the tube is distended with blood which has trickled along right to the uterine end. On the other side the tube is distended with clear fluid which can by gentle pressure be squeezed out from the divided uterine end. In both cases the ampullary portion of the tube is most affected. On each side there is closure of the fimbriated opening, in the case of the hydrosalpinx probably prior to the fluid accumulation, in the case of the tubal mole, secondary to the development of pregnancy.

Discussion of the Etiology.—In Case I. there is no definite evidence of abnormality sufficient to explain the detention of the ovum in the tube. As described, there was well-marked fusion across the lumen of the folds on the inner side of the gestation cavity and, whilst, on the whole, the appearances presented suggest rather an old-standing condition probably of inflammatory origin, no conclusive statement is possible in view of the comparatively advanced stage of the pregnancy.

In Case II., on the other hand, the appearances found suggest that the developing ovum in its passage along the tube had become lodged in an intra-muscular diverticulum from the tube lumen.

In Cases III., IV., and V. there was no evidence of obstruction

just beyond the apparent site of the gestation sac. In Cases III. and IV., however, careful investigation of the tube on the inner side revealed the presence in each case of a distinct, though still incomplete, constriction of the tube lumen at a distance from the apparent site of the gestation sac. It is impossible to draw definite conclusions on a question of this nature from such a limited number of cases; it seems, however, feasible to explain the detention of the fertilised ovum in these cases as due to an interference with the passage of the stream of fluid, probably small in amount, which under normal circumstances flows along the tube towards the uterus, either as the result of ciliary action or of peristaltic contraction of the tubal muscle, and by means of which the ovum is transported to the uterine cavity after gaining access to the tube.

The process here conjectured corresponds to what seems to occur in the formation of the larger proportion of the cases of hydrosalpinx. In this condition, in the typical case, there is the production of a retention cyst in a tube, whose abdominal ostium is occluded by inflammatory fusion of the fimbriæ, and from which the fluid poured into the tubal lumen, perhaps by a process of secretion, is prevented from escaping into the uterus. The point on which I desire to lay particular stress is, that in few of such cases is there ever discoverable complete occlusion of the tube on the inner side. Bland-Sutton, in referring to the causation of hydrosalpinx, says, "It is a fact of some interest that the uterine end of the Fallopian tube is rarely obliterated in salpingitis." Again, he says, "The steps of this change are similar to those which occur in the gall-bladder and kidney, secondary to obstruction of the cystic duct or the ureter." It seems highly probable that the distension of the tube in hydrosalpinx is due to the fact that the fluid enters the tube lumen more quickly than it can escape, thus resembling the formation of a hyhronephrosis in stricture of the ureter or urethra. The exact nature of the obstruction on the inner aspect is not clear; it may be due to swelling of the mucous folds, kinking of the tube, &c. In any case it is probably, as in the ureter and urethra, incomplete or intermitting.

The analogy between the condition of the tube in hydrosalpinx and in the cases of tubal gestation above-mentioned suggests that the same cause may have operated in each condition, with the necessary reservation, in the case of tubal pregnancy, that the abdominal ostium must remain patent. The obstruction on the inner side in neither of the cases is sufficient to prevent the

upward passage of the motile spermatozoon, but would be sufficient to prevent the passage of the normal stream of fluid from tube to uterus, leading to a detention and stranding of the ovum in the tube, till the trophoblastic layer is developed to an extent sufficient to allow of imbedding in the tube wall.

In this connection, it is interesting, and, to a certain degree, confirmatory, to note that the last case of the series provides an example of hydrosalpinx on one side with a pregnancy on the other side, represented by a hæmatosalpinx. In neither tube was there evidence of obstruction on the uterine side of the distended sac.

If this contention be justified, namely that any abnormal condition, leading to a slowing or stasis of the stream of fluid responsible for the transportation of the fertilised ovum from tube to uterus, may predispose to the ingrafting in the tube wall, even at a considerable distance behind the obstruction, we have an explanation of several otherwise apparently anomalous facts. In the first place, the occurrence in so many cases of the gestation in the ampullary region of the tube, where the lumen is at its widest and in cases where there is no evidence of obstruction, would seem to militate against the obstructive theory. In the light of the above-mentioned suggestion, however, it would seem highly probable that, with a damming back of the fluid stream by an obstruction even at the uterine end, if the ovum gains admittance to the tube and there develops, the ampulla will be the site chosen for the ovum bed. This would seem the more likely where the obstruction is well marked, with a consequently distinct slowing of the fluid stream.

In view of the overwhelming evidence in the literature, the obstructive theory would seem to occupy a well-nigh impregnable position as an explanation, at any rate, of a certain number of cases of tubal pregnancy. The indisputable occurrence of the gestation in the tubal *cul-de-sac* leading from an accessory ostium, of which there are a number of cases in the literature, and the undoubted development in some cases of the embryo in a diverticulum from the tube lumen, would of themselves stamp the theory with the mark of certainty. The experiments of Mandl and Schmidt[1] in rabbits have been held up by some observers as dealing the death-blow to this theory. These investigators ligatured the genital tube in these animals at different levels soon after copulation; taking advantage of the fact that a well-defined interval has

[1] "Beiträge zur Aetiologie und path. Anatomie der Eileiterschwangerschaften," *Archiv. f. Gyn.*, 1898, lvi. 401-487.

been shown to exist between the insemination and the fertilisation of the ova, they allowed just sufficient time to elapse before applying the ligatures. In none of the experiments did they ever discover development of the ova in the abdominal portion of the ligated tube, though this occurred as usual on the proximal side.

It seems to me that an extension of the above-mentioned suggestion embraces this apparent anomaly and transforms what at first sight appears to be a potent *con* into an equally convincing *pro*. The greater the obstruction in the course of the tube lumen the greater the stasis of the fluid stream and the less the chances are of the ova managing to gain entrance to the tube. If the obstruction be great (or, as in these experiments, complete), and the ova manage to enter the tube, it seems not unlikely that they will be rejected by the back-flow of fluid from tube to peritoneal cavity. The existence of this back-flow in an obstructed tube, though speculative, would seem to be a physical necessity if the abdominal ostium be patent, and we admit the occurrence of a fluid secretion or of peristaltic contraction of the tubal muscle. The same conjecture has been advanced by Neu[1] as an explanation of the non-closure of the abdominal ostium in some cases of salpingitis, whilst in others it becomes sealed and a hydrosalpinx results.

To summarise, the less marked the obstruction in the tube is, the greater is the chance of the ovum being carried into the uterus. When the obstacle is more distinct the risk of the developing ovum being retained in the tube is increased, whilst when the obstruction is nearly complete the chances are in favour of the ovum being refused admittance altogether, or of its being ejected soon after entrance. An application of these considerations would seem to offer an explanation of a fact urged against the obstructive theory, namely, that whereas salpingitic narrowing of the tube canal is of frequent occurrence tubal pregnancy is of comparative rarity.

In the above argument it has been assumed throughout that the constriction of the tube lumen is not sufficient to prevent the upward passage of the small actively motile sperm cell. This reservation would seem to be unnecessary in some cases, in view of a fact repeatedly demonstrated, namely, that the developing corpus luteum may be present in the ovary of the opposite side, suggesting the probability of the fertilised ovum having migrated from one side of the pelvic cavity to the other.

[1] *Vide supra.*

Engulfing of Tubal Fimbriæ.—In four of the specimens the tubal fimbriæ are withdrawn into the tube lumen. In Case III. this is present, though not to a marked degree. In Cases I. and V. the retraction is more evident, whilst in Case IV. the fimbriæ, corresponding to the portion of the tube wall distended to form the mole cavity, have practically disappeared (Fig. 3, Plate E). It will be noted that in all the specimens the distension involves the ampullary portion of the tube. It has been repeatedly shown that retraction of the fimbriæ and occlusion of the abdominal ostium is encountered much more frequently where the outer end of the tube is affected. According to Bland-Sutton, "when the oösperm is retained in the isthmus or in the uterine section of the tube the cœlomic ostium is rarely affected."

In Cases III., IV., and V. examination of the tube wall reveals the fact that the attenuation of the muscular coat as the result of the distending force has extended right up to the abdominal opening. In Cases III. and V. this thinning of the tube wall is well marked round the entire circumference, whilst in Case IV. it is seen to involve only that portion of the wall forming the blood cavity.

These facts suggest that the disappearance of the fimbriae within the tube lumen is not entirely dependent, as has been suggested, on an increase in the substance of the tube wall leading to a lengthening and projection of the peritoneal and muscular coats over the tubal fimbriæ. The engulfing of the fimbriæ would seem rather to be associated with the process of stretching and thinning of the tubal wall, a conclusion which is especially vindicated by a study of Case IV., where the receding fimbriæ correspond to the attenuated portion of the wall, the other fimbriæ remaining unchanged.

The thinning of the wall is obviously due to the augmented tension to which the tube is subjected by the increasing contents, and to this the weakening of the structures as the result of interference with the blood supply probably contributes. The traction exercised by the distending wall would tend to drag the outer portion of the tube as a whole over the outer pole of the distending object, be it blood or growing ovum, *i.e.* it would tend to open up the abdominal ostium; this may partly explain the mechanism of tubal abortion.

In the four cases described above the contents have not been expelled through the abdominal aperture, and it seems to me that in these cases the engulfing of the fimbriæ is to be traced to a fact

noted in connection with them all, namely, that, even in places where the muscular wall of the tube is so thinned out as to be reduced to the thickness of paper, the mucous folds stand out as prominent ridges. This condition is also sometimes seen to a marked degree in cases of hydrosalpinx, where the tubal wall may be thinned out to a fine transparent membrane and yet the folds remain distinct.

To understand what probably occurs, we have to appreciate the various steps in the distension of the tube in hydrosalpinx and hæmatosalpinx. The distension in the diameters transverse to the axis of the lumen is associated with stretching and thinning of the muscular and mucous coats. The stretching of the mucosa must occur chiefly between the mucous ridges, and may be associated with some separation of the epithelial surfaces of the folds at their bases, a possibility borne out, to some extent, by the fact that the main ridges in the distended tube in a case of hydrosalpinx are not only separated from one another by a larger interval than normal, but they are shorter and less complex. To produce distension of the tube in the longitudinal direction the force exercised by the increasing contents has to contend with the longitudinal bands in the shape of the mucous ridges which strengthen the tube wall on the inner aspect. The resistance to a stretching force on the part of the rugæ is probably enhanced when they are turgid with decidual cells.

In other words, it seems likely that the tube wall withstands an attempt at distension more efficiently in the longitudinal direction than in the transverse. It seems not improbable that the mucous ridges, though stretching materially, resist the distending force to a considerable degree, and that the giving of the tube in this direction is produced at the expense of a certain amount of overriding of the inner portion of the tube wall on the outer.

When we endeavour to discover the site of this gliding process, we are confronted with the fact that the mucosa of the tube and the circular muscular coat are closely adherent the one to the other, and the intimacy of this connection is further increased by the fact that muscular strands are projected into the larger of the mucous ridges. The two muscular coats, on the other hand, are not so inseparably associated, for in conditions of œdema, such as in salpingitis and tubal gestation, it is frequently seen that the two layers are separated by a distinct interval. This is well shown in some of my sections. Even at the fimbriated end, where the muscular fibres interlace more or less irregularly

with one another, the same œdematous condition is sometimes present, leading to a more or less distinct demarcation between the inner and outer layers of muscle. The loose connection between the two muscle layers is strikingly brought out by the fact that blood extravasated into the tissues of the tube in tubal pregnancy not infrequently works its way around and along the wall between the two muscle coats, in this way apparently pursuing the path of least resistance. This is exemplified in one of the cases of this series.

The shearing movement, then, would be permitted between the two muscular layers. What probably occurs in these cases is that the distension of the tube wall in the longitudinal direction is associated with a certain amount of overriding of the mucous membrane and inner circular coat over the outer coat, resulting in traction on, and retraction of, the tubal fimbriæ which are, in reality, merely tubal folds projected beyond the abdominal ostium.

In three of the specimens of the series the abdominal ostia were patent in the sense that a probe could be introduced into the tube lumen with ease. In spite of this the blood lying free in the tube lumen in two cases had accumulated to the extent of forming a large blood mole. This is probably accounted for by the fact that the cohesion of the enlarged and congested mucous folds had been sufficient to prevent the blood from escaping as quickly as it was poured into the lumen. As the fimbriæ became retracted in the course of the distension of the tube, and became bunched together at the ostium, the impediment to the escape of the blood would be still further increased.

In another of the cases the blood had apparently been retained in the tube by the formation of a cyst round the retracted fimbriæ. This, as has been pointed out by Taylor, seems to be due to the formation of a cyst in adhesions produced by tissue reaction round blood which trickles slowly from the tubal opening.

The preparation of this paper has necessitated the liberal introduction of references to the literature of the pregnant tube. These have, in every case, been acknowledged in the text. In conclusion, I desire to record my indebtedness to two papers written by Russell Andrews,[1] and incorporating an excellent and exhaustive critical analysis of the literature of the subject up to the year 1906.

[1] *Journal of Obst. and Gyn.*, vol. iii., May 1903; vol. ix., June 1906.

DESCRIPTION OF PLATES.

Plate A, Fig. 1.—Case I.—Gestation sac in ampulla, showing rent in posterior wall, through which fœtus and membranes escaped. Mucous folds shown on anterior tube wall—lumen seen opening into inner pole of cavity. Fimbriæ retracted. Ovary with cyst over which the corpus luteum is flattened.

Plate A, Fig. 2.—Case II.—Blood mole in upper wall of tube, with large amniotic cavity and small fœtus. Amnion detached from chorion in places. Tube lumen below. At outer pole see fimbriæ and at inner pole divided tube and tube wall extending up on to mole.

Plate B, Fig. 1.—Case I.—Tube on inner side near gestation sac in Case I. Fusion of folds across lumen: most of folds swollen with decidual cells. Areas of blood clot indented with swollen folds, which have shrunken during hardening process. Note œdema of tissues, and separation of muscular coats. Towards upper and right aspect muscle layers separated by blood tract.

Plate B, Fig. 2.—Decidual formation in tube folds on uterine side of gestation sac. Note leucocyte increase in lower part.

Plate B, Fig. 3.—Case II.—Section across tube on uterine side close to blood mole. Complex fusion of mucous folds transforming lumen into small-meshed spongework.

Plate B, Fig. 4.—Adenoma-like proliferation of epithelium in tube wall opposite to that occupied by ovum. Note straying of epithelium-lined tracts into the wall in an irregular manner. Tube lumen below.

Plate C, Fig. 1.—Showing fusion of three villous projections. Cells flow together; multiplication of nuclei and folds united by syncytium-like mass.

Plate C, Fig. 2.—Collection of large decidua-like cells under endothelium of vessel. Note that the endothelial lining shows no evidence of proliferation.

Plate C, Fig. 3.—Opposite tube wall with large decidua-like cells imbedded in homogenous structureless matrix.

Plate C, Fig. 4.—Membrana capsularis formed by tube wall, the muscle of which is undergoing fibrinous degeneration. In upper part see villi imbedded in blood; in lower part see tube lumen. Note dilated vessel.

Plate D, Fig. 1.—Villus incorporated with wall of maternal vessel. Note two cellular layers of villus and invasion of maternal tissue by Langhans' cells.

Plate D, Fig. 2.—Area in mole near tube wall where the blood is not clotted. In upper part see degenerated villus imbedded in blood clot. Villous surfaces in contact with circulating blood have retained their epithelial layers.

Plate D, Fig. 3.—Case III.—Section across tube showing large canal (diverticulum) with blood clot and small canal, each with distinct muscular wall.

Plate D, Fig. 4.—Showing small channel connecting two tube lumina and small aperture, almost completely blocked by mucous folds.

Plate E, Fig. 1.—Large blood cavity in outer end of tube continued on inner side into blood-distended *cul-de-sac*. Inner end of tube represented by fine channel. Wedge removed to show position of lumina.

Plate E, Fig. 2.—Ampulla of tube distended by blood—tube convoluted on inner side.

Plate E, Fig. 3.—Blood cavity in outer end of tube, the wall of which is formed almost completely by greatly stretched and attenuated upper aspect of tube. Convoluted portion of tube on inner side overhangs fimbriated end, and seen that fimbriæ in relation to distended portion only have receded. Bristle indicates original course of tube lumen. (Section carried across plane represented by dotted line in Fig. 2.)

FROM THE SKIN DEPARTMENT OF THE ROYAL INFIRMARY.

The Cutaneous Tuberculin Reaction in Skin Diseases

By R. CRANSTON LOW, M.B., F.R.C.P.,
Assistant-Physician.

Although the number of articles already published on von Pirquet's tuberculin reaction is astonishingly large, the number of those dealing with skin diseases is still comparatively small. I venture to think that the following results of the examination of 75 cases of skin diseases will not be superfluous. The cases which were tested were all patients under treatment in the Skin Wards of the Royal Infirmary under the charge of Dr. Norman Walker, to whom I am indebted for permission to publish the results. The cases were not selected in any way. The test was applied quite independently of the disease from which the patient might be suffering. The method used was as follows:—The skin of the upper arm was well scrubbed with ether; then with an ordinary needle, which was sterilised by passing through the flame of the spirit-lamp, the skin was scarified. Three parallel scratches, of not more than three millimetres in length, were made as closely as possible to each other, and three similar scratches at right angles to the first three. As far as possible one avoided causing actual bleeding. If bleeding did occur, one waited till it stopped before proceeding further. Two such areas were scarified at a distance of about one inch from each other. To the uppermost area was applied the control solution, consisting of glycerin acid. carbol. (5 per cent.), one part, and saline solution (·75 per cent.), two parts. A drop of the solution was applied with the loop of an ordinary bacteriological platinum needle, and gently rubbed into the area. The platinum loop was then thoroughly heated in the flame of the spirit-lamp, and when cool a drop of the tuberculin solution, of the same composition as the control solution, but with the addition of 25 per cent. of human old tuberculin, was applied to the lower scarified area. At first only these two solutions were used, but later a third solution, with bovine old tuberculin instead of human tuberculin, was applied to another scarified area. The tuberculin and control solutions were allowed to remain untouched for about five minutes, and then a piece of lint was fixed over the part by means of strapping.

In the majority of cases there was no difficulty in seeing within 24 hours whether the result was positive or negative. In the positive cases a red halo was usually quite well marked within 24 hours. Three varieties of positive reaction were observed:—(1) A simple

erythema, which sometimes extended as far as three-quarters of an inch outwards from the centre. This erythema did not always extend the same distance outwards all the way round, but had an irregular outline. The redness gradually faded off into the normal skin, and there was no palpable infiltration of the skin. (2) A complete ring-shaped zone of erythema all around, with distinct palpable infiltration of the skin, and on close inspection one could see in the area of congestion minute red slightly-raised papules. (3) The most severe reaction where, in addition to the well-marked zone of redness around, with a feeling of infiltration, the centre had a brownish-yellow colour with œdema and almost vesiculation.

The redness in most cases lasted for from three days to a week, and then gradually faded, the centre becoming scabbed over and the edges being scaly. For some time in many cases a brownish scaly area remained.

As a rule the reaction was definitely present at the end of 24 hours, but in a few cases not definite till 48 hours. In one case a delayed reaction after four days was seen.

Out of 75 cases suffering from 25 different skin diseases, 40 gave positive and 35 negative reactions.

Twelve cases of lupus vulgaris were tested, and all gave marked positive results. One case of tuberculous ulceration of the skin gave a positive result, and three tuberculides (one lichen scrofulosorum, one Bazin's disease, and one anomalous tuberculide) all gave positive results. Therefore all the tuberculous lesions gave a definite positive reaction.

In 4 cases of lupus erythematosus, 2 were positive and 2 negative. A fifth case of doubtful generalised lupus erythematosus also gave a positive result. This latter patient also suffered from angio-keratoma, which is considered by some to be associated with tuberculosis.

Out of 11 cases of dermatitis, 5 were positive and 6 negative, and out of 10 cases of psoriasis, 4 were positive and 6 negative.

One case of erythema multiforme gave a slight reaction which was delayed for 4 days, but on a second application of the test a marked positive result was obtained in 24 hours.

Two rodent ulcer cases both gave positive results. In one of these cases, in a man aged 58, the positive result could be accounted for by a healed sinus in the front of the right shoulder. This sinus had discharged for some months thirty-six years previously, but had never given any trouble since then.

Two cases of favus both gave positive results, as also did 2 cases of furunculosis. Of 2 cases of dermatitis herpetiformis, one gave a positive reaction. A case of pityriasis rubra pilaris gave a positive result, but the patient was also suffering from pulmonary tuberculosis.

An acne of the face and back gave a positive reaction, but he

also had had tuberculous glands in the neck excised 11 years previously. Out of three tertiary syphilides one was positive, and out of two prurigo cases one was also positive.

The following cases all gave negative reactions:—4 chronic leg-ulcers, 2 ichthyoses, 1 kerion, 4 seborrhœic dermatites, 1 eczema, 1 scabies, 1 scleroderma, 1 sycosis, and 2 impetigo cases.

Out of the 40 cases which gave positive results, if one excludes the 16 definitely tuberculous lesions and the 4 cases where tuberculosis was present elsewhere than in the skin, there are left 20 cases (*i.e.* 26·6 per cent.) where the skin condition was certainly not tuberculous and yet a positive result was obtained. Therefore the method is quite useless as a diagnostic aid in doubtful cases of tuberculosis of the skin unless a negative result be obtained. The positive results obtained in these 20 cases referred to, were presumably due to latent tuberculosis in some of the internal organs.

Only 7 cases were tested with bovine tuberculin in addition to human tuberculin. Two cases (a tuberculous ulcer and a lupus) gave a positive result to both kinds, the others were all positive to the human and negative to the bovine tuberculin. In no case was a positive result obtained to the bovine tuberculin alone. The possibility of some cases of skin tuberculosis being due to the bovine bacillus or a mixture of the human and bovine bacilli may explain why some cases of lupus improve so much less than others under treatment by injections of human tuberculin.

From an observation of the above cases the following conclusions seem to be justified:—

1. All tuberculous skin lesions give positive reactions.

2. The degree of the reaction is no index of the activity of the disease.

3. A positive result does not necessarily mean that any skin lesion which is present is tuberculous in nature, as the reaction may depend on tuberculosis of some other organ.

4. A negative result is of more value than a positive result for the same reason just mentioned.

5. The method is of no assistance in determining whether any tuberculous lesion is active or not, as both active and apparently healed lesions give positive results.

6. The method gives no aid in determining whether a tuberculosis of the skin is cured or not.

7. Before deciding what kind of tuberculin to employ in treating a tuberculous skin lesion by injections, it is advisable to apply Pirquet's test with both human and bovine tuberculin.

LETTER TO THE EDITORS.

Cancer of the Penis and its Extirpation.

Sirs,—Mr. Alexander Don, of Dundee, is interested in the operative treatment of penile carcinoma. He has been reading a paper of mine on the subject, and has himself written an article which appears in the July issue of the *Edinburgh Medical Journal*. In that article he describes a method of operating in which he embodies his views on several points of the subject. He does not indicate whether he has ever tested in practice the method of operating he describes (and, if so, the results, immediate and ultimate), or if his views are to be taken merely as suggestions based on ideas which have occurred to him. Information on this point would be important, as, *primâ facie*, two, at least, of the steps in the operation outlined invite unfavourable criticism. One of these appears to preclude efficient removal of the inguinal fat and its contained lymphatics, while the other seems likely to make early healing exceptional in a wound which commonly presents a peculiar feature in the shape of a constant, and often copious, flow of clear lymphatic fluid. Criticism of untried methods, however, is unprofitable. Mr. Don's ideas will stand or fall in the light of actual experience.

My object in writing is, not to criticise Mr. Don's views, but to suggest that his enthusiasm leads him, doubtless unintentionally, to be less than just to me and my opinions. As his article indicates, he looks, on the whole, favourably on the operative procedure I have found useful, but he thinks it might be improved; and, in dealing with it to that end, he says (*Edin. Med. Jour.*, July 1909, p. 16), "J. H. Nicol of Glasgow, in a recent issue of the *Annals of Surgery*, describes an operation for removal of the inguinal glands, which is extensive but not radical. He does not follow the trunk passing along the inguinal canal to the glands above Poupart's ligament as a routine method, though some of them, as we have seen, are primarily affected. He also begins his dissection from below, which involves much handling of the diseased portion," and then proceeds to describe in detail the method of operating which he suggests for use.

I desire to make clear the following points:—

(1) The operation I have found useful was not, as Mr. Don's statement would seem to indicate, published in a recent issue of the *Annals of Surgery* (February 1909). It was published in the *Glasgow Medical Journal* for May 1906, as having been described to the Glasgow Pathological and Clinical Society in November 1905. The recent paper in the *Annals of Surgery*, to which Mr. Don alludes, was a fresh reference to the operation in connection with four additional cases in which it had been carried out.

(2) I do not, as Mr. Don states, begin my dissection from below. The parts outlined by the incisions are dissected out from above downwards. Mr. Don has presumably access to the paper he quotes. The successive steps of the operation are indicated therein by number, and the dissection proceeds as follows:—groins and inguinal regions first, dorsal lymphatics and blood-vessels of penis next, carcinomatous penis last.

(3) Had I reason to suspect any surgeon holding responsible public posts of anything quite so surgically terrible as the handling of an ulcerating penile carcinoma prior to and during the course of an extensive inguinal dissection, I should probably feel tempted to make comment, but I think I should verify my suspicion by inquiry or observation before publicly crediting him with the procedure. Had Mr. Don made inquiry in my case, he would have found that, though I did not think it necessary to bore surgical readers with a description of an application of elementary surgical principles familiar to every student at the end of his first clinical term, I cover up the carcinomatous portion of the penis exactly as he suggests, and that while doing so I wear sterilised rubber gloves, which I remove before lifting my knife.

(4) Mr. Don pronounces my method "not radical" because I do not, as a routine procedure, follow the trunk passing along the inguinal canal. One might, on the same lines, be tempted to doubt the efficacy of Mr Don's plan, because he does not, as a routine procedure, follow other exceptionally invaded trunks, which he describes as passing over and under the symphysis to the internal glands. Mr. Don's statement notwithstanding, the method I have employed for some fifteen years has *apparently* proved radical in a certain proportion of my cases, which is perhaps as much as can be said for any method of operating for cancer in whatever region situated. And I should like to make clear what Mr. Don, in reading my recent article, has apparently missed, that both of my papers specifically deal with "operable" cases, and that within that term my experience hitherto has not led me to place cases in which the deep inguinal glands have become involved, whether by the ordinary routes or by such channels as Mr Don appears to have found infected.

In conclusion, while I believe I have reason for my letter of personal protest, I may be permitted to say that I have read Mr Don's article with satisfaction in one respect. His plea, founded on the work of Alexis Thomson and others quoted, for earlier diagnosis and operative treatment, concerns an aspect of the subject of greater importance, relatively to the prospect of "radical" treatment, than the evolving of plans for eradicating more or less inaccessible internal inguinal lymphatics.—I am, Sirs, yours faithfully,

JAS. H. NICOLL.

OBITUARY.

PETER ALEXANDER YOUNG, M.D., F.R.C.P.

It is with sincere regret that we record the death of this well-known and much esteemed Edinburgh physician.

Although for a few years past evidences of failing health had become apparent, and had excited the sad and sympathetic interest of his friends and brethren, it was hoped that Dr. Young's relinquishing work and removing to the south of England might have the effect of prolonging his life. But this was not to be, and he passed away at Bournemouth on 25th June.

Of Scottish parentage, Dr. Young was born in Australia. As a youth he came to Edinburgh to study medicine, and, after a diligent career, graduated with honours at the University in 1867. After a period of study in Vienna, and of service as House Surgeon in Perth Infirmary, he was engaged as an assistant to the Badischer Frauen Verein at Heidelberg during the Franco-Prussian War. In the early seventies Dr. Young settled in practice at Portobello, where for many years he held a leading position. On his subsequent removal to Edinburgh he soon acquired an extensive general practice, his sound professional knowledge and his personal qualities rendering him peculiarly well fitted to excel in this work. In the midst of his professional activities Dr. Young yet found time to devote to many good causes. Only a few of these can be referred to. He served for many years as a medical officer in the 1st Midlothian Artillery Volunteers, attaining the rank of Surgeon Lieutenant-Colonel (V.D.). He took an active interest in ambulance work, and held the office of Chairman of the St. Andrews Ambulance Association. He was an earnest advocate of the cause of temperance. Although not a teacher, Dr. Young was well-known to the students of the University and Medical School by his long connection with the Students' Christian Association, of which he was one of the oldest members, and with the Students' Australasian Club, of which he was a warm friend and supporter.

But it was as Treasurer of the Royal College of Physicians, Edinburgh, that Dr. Young was probably best known to his professional brethren. To this office, which he held for many years, he gave his energies unsparingly. The post involves much more than the management of the finances of the College, important though this be, as it includes the direction and supervision of all matters connected with the College buildings and property, and with the domestic arrangements, entertainments, etc. No happier selection could have been

made for this position than Dr. Young. He proved a wise administrator of the funds of the College, jealously guarding its financial interests, while his uniform urbanity, courtesy, and geniality made him readily accessible to the Fellows, and gained for him their respect and affection. It is surely not unfitting to observe that his fine presence and bearing seemed to give an added dignity to the office he held.

When ill health forced him to resign, Dr. Young received at the hands of the College a substantial testimonial, as an expression of its sympathy and of the high value placed upon his long and efficient service.

Dr. Young leaves behind him the memory of a life of high purpose, earnestness, and unselfishness, and of large-hearted readiness for every good work. J. O. A.

THE tidings of the decease of Dr. Young, late of Manor Place, Edinburgh, has awakened many memories of happy intercourse with him in past years, and deep regrets that one so much beloved and so highly esteemed should have passed away. The writer had the privilege of intimate friendship with Dr. Young since the year 1863, when, as close neighbours, we commenced our studies at the University simultaneously. Daily, for the four years of our term of professional study, we lived and worked together. Young was remarkable for his diligence and industry as a student, he was deeply interested in his work, and, being gifted with abilities of high order, he attained a thorough and intimate knowledge of the various departments of medical study, and finally graduated with honours.

Among other engaging qualities, Young was notable for his brightness of spirit, his gaiety, and his deep fund of humour. A Scotsman by inheritance—though his earlier years had been spent in Australia—he had a Scotsman's love for a good story, and his memory was richly endowed with many such, which he could tell in a most effective manner. No wonder we all loved his companionship. He was loyal to his friends, and, indeed, loyal to every belief and principle that he knew to be right: often have I known him champion bravely some belief or principle which, in the irresponsible chat of a party of students, was being thoughtlessly assailed. It requires some courage to do this. Underlying his merriment and cheer was an unusual strength of character and stern belief in certain fixed principles. There was not a grain of cant in Peter Young, but he was always a steadfast and consistent Christian man; never obtruding his belief, while he could not help its being seen unconsciously in every word and act. I could say much of the beauty and happiness of his home life.

In sports and athletics, and in the work of the debating societies of our student days, he was active and enthusiastic; in later life he

was, from loyalty to his country, an active Volunteer officer, as well as (from interest in Scottish history) a member of the Royal Bodyguard of Archers. His services as surgeon in the field during the Franco-Prussian War were of much value, for there, as in everything he undertook, he threw his whole soul into the work.

Others who dwelt in Edinburgh can speak better than I as to his work as a magistrate, as a physician, and as a prominent official of the Royal College of Physicians, but, knowing the man, I know what his work would be.

His loss is a sore one to those who loved him, and they were many. His memory will be a bright and fragrant one to all of us, full of incitement to copy an example of honour, truth, unselfishness and usefulness. RICHARD CATON.

WILLIAM A. FINLAY.

ON the 24th June, at his brother's residence in Nairn, there passed away one who was for many years a well-known practitioner in Trinity. During recent years Dr. Finlay had been on several occasions laid aside by severe attacks of influenza, but last autumn, on account of a serious throat affection, he had to relinquish practice altogether, and retired to Nairn.

The second son of the family, Dr. W. A. Finlay adopted the profession of his father, which his elder brother, Sir Robert, had also chosen but relinquished very early for that of law. Passing from the Academy to Edinburgh University, Dr. Finlay graduated as M.B. in 1867, taking his M.D. in 1870. He later took the M.R.C.P.Edin., and in 1877 the Fellowship of the Royal College of Surgeons, subsequently being appointed an examiner in clinical surgery for the College. On his graduation he was chosen as house-surgeon by Syme and occupied the post for twelve months, and all through his subsequent career showed a leaning towards the surgical side of his profession. For a short time he practised in Brechin, but, returning to Trinity, he built up an extensive general practice there.

Early in the seventies (when the hospital staff was not yet differentiated into surgeons and physicians) he was appointed to the staff of Leith Hospital, and from the outset showed his preference for surgery; and when in 1888 arrangements were carried through for the clinical instruction of lady medical students at Leith Hospital, Dr. Finlay was appointed Lecturer on Clinical Surgery, being assisted by Dr. Calder, and this work he continued till the doors of the Royal Infirmary were opened to lady students. In these early days the teaching of practical work to ladies was not such a familiar feature in hospital wards as it now is, so that in one sense Finlay may be regarded as a pioneer in

Scotland in this connection. To a man of his refined, sensitive, and almost shy nature, some of the work was not altogether to his taste, but he threw himself into it with all his usual energy. By his students he was universally beloved, and to many a lady doctor in different parts of the world the memory of Finlay in the wards and theatre of Leith Hospital is one of the pleasantest recollections of her student days. As a teacher, he showed an unfailing courtesy, refinement and gentle consideration of another's feelings which endeared him to students, nurses, residents and patients.

To the end of his career in Trinity he acted as medical officer for Cargilfield School, a work in which he took a keen interest, but from any kind of public work he had a natural shrinking. He was elected President of the Harveian Society last year, but was prevented by his ill-health from delivering the oration at the Festival. He was a member of the "Round Table" Club, and was to be seen at his best when, with congenial friends, he contributed his share of song or story with a twinkle of his eye that foretold the coming pawky humour. A keen fisher, he was even fonder of golf as a relaxation from the cares of practice, the anxieties of which were apt to tell too keenly on his sensitive and over-anxious nature. To many an old "resident" the news of his death will be read with a real sorrow, for there was in the old "chief" something most lovable and unforgettable.

H. G. L.

His former colleague, Dr. Calder, sends the following note:—

"In the year 1881 I was appointed a member of the staff of Leith Hospital, and taking up surgical duty, I came much in contact with Dr. Finlay, who for some years had been devoting himself to the surgical work of the hospital. At that time the residential staff was comparatively small. In all major operations, therefore, it was necessary to render each other assistance, and in consequence a much closer professional relationship sprang up between Dr. Finlay and myself than is usual in such appointments. From the outset I was much impressed with his delightful personality. Unassuming and courteous in manner, and not without a certain vein of quiet humour, he proved himself on all occasions most kind and helpful to those associated with him. With colleagues, nurses and patients alike he was a general favourite, thanks no less to his genial and sympathetic manner than to his genuine goodness of character. As a surgeon, Dr. Finlay occupied a high position, and was as devoted to his work as he was loyal and disinterested in his friendships. By his students he was highly esteemed as a teacher, and many now scattered far and wide in distant lands will learn with keen regret the news of his all too early death.

But to those who like myself were privileged to know him intimately, his most outstanding characteristic—and this I hold higher far

than mere intellectual capacity—was his fine conscientiousness, and above all his absolute purity of mind and singleness of purpose.

'Those about him
From him did read the perfect ways of honour'

and to them his memory must ever remain as that of an upright man, a beloved companion, a sure and steadfast friend."

ANDREW JAMES DUNCAN, M.D.

It is not purely a matter of accident that Cicero's two charming essays on "Old Age" and "Friendship" are found combined in one volume, since the further we advance on the journey of life, the more we appreciate those tried friends of our youth whom time has still spared to us, and the more poignant our grief when they are taken away. It is therefore with no ordinary feelings of sorrow that I accede to the request to write an obituary notice of the late Dr. Andrew James Duncan, of Dundee, as our acquaintanceship commenced very early in our student career, and our amity has lasted unbroken for forty-eight years, while during forty-four of these we have regularly corresponded, at unequal though frequent intervals, occasionally meeting, and on three occasions, at least, travelling together abroad. We visited Holland and Belgium in 1879, Norway in 1890, and only two springs ago we spent a delightful month together in Provence, Greece, and Asia Minor. Of nine who sat at the same table on board *The Argonaut* during that voyage, three have joined the majority, all then in fair, if not robust, health. Few, therefore, can have known Dr. Duncan longer or more intimately than the writer.

He was born at Chittagong, India, in 1843, the son of James Duncan, M.D., a surgeon in the Bengal Establishment of the Honourable East India Company. Both his parents died while he was young, and he was educated at Dundee, and brought up under the care of his maternal grandfather, a solicitor, whose descendants still carry on the business, now one hundred and fifty years old. His paternal grandfather was Dr. Andrew Duncan, minister of Ratho, a noted divine of his day, Principal Clerk of the General Assembly for many years, and Moderator in 1824. His uncle was Dr. Craig of Ratho, father-in-law of the late Dr. G. W. Balfour. After a short course of Arts at St. Andrews, he studied medicine in Edinburgh, and graduated M.D. in 1865. The greater part of the next year was passed in Vienna and Paris, and in several long and interesting letters addressed to me from both cities he gives proof of the assiduity with which he pursued his studies, while drawing vivid pictures of the various professors, and detailing and criticising their modes of teaching. Soon

after his return to Scotland he began practice in Dundee as a general practitioner, but in addition he devoted special attention to the eye, and held the office of Ophthalmic Surgeon to the Dundee Royal Infirmary, as also to the Dundee Eye Institution. He was at one time President of the local branch of the British Medical Association. In one capacity or another—Acting Physician and Surgeon, Consulting Physician and Hon. Ophthalmic Surgeon, and as Director for some years—his connection with the Infirmary extended over forty-one years. Though, as has been stated already, he had a facile epistolary pen, and could and did write admirable letters, he never could be induced to contribute any article to medical literature, further than reading notes of cases at the meetings of the Forfarshire Medical Association. This may partly account for the fact that while he enjoyed a considerable practice he never reached the position which his study and attainments deserved. Another circumstance which militated against absolute success was a certain indecision in manner in dealing with patients, so that, though much liked and fully trusted by those who knew his sterling worth, he failed to impress strangers with a due sense of his capacity. He had a special faculty of making friends wherever he went, he took a deep and genuine interest in the welfare and progress of those for whom he cherished a regard, and his advice was invariably sound and reliable. His great hobby was botany and practical horticulture, for the pursuit of which the somewhat extensive grounds attached to his house afforded him scope. He was never happier than when among flowers, and had an extensive knowledge of them. Indeed there is reason to believe that his devotion to gardening hastened his end, for he spent from 4.30 to 10 P.M. with scarcely a check, arduously working in his garden on the day before the occurrence of the apoplectic seizure which carried him off. The soul of honour without a tinge of jealousy in his nature, kindly and large-hearted, a staunch and affectionate friend, one cannot conclude this notice better than in the words of Cicero—"Ego vos hortari tantum possum, ut amicitiam omnibus rebus humanis anteponatis; nihil est enim tam naturæ aptum, tam conveniens ad res vel secundas vel adversas. . . . Quanta autem vis amicitiæ sit ex hoc intellegi maxime potest, quod ex infinita societate generis humani, quam conciliavit ipsa natura, ita contracta res est et adducta in angustum, ut omnis caritas aut inter duo aut inter paucos iungeretur."

W. A. J.

MEETINGS OF SOCIETIES.

Edinburgh Obstetrical Society.

THE last meeting of the session was held at 5 St. Andrew Square on Wednesday, 14th July.

Dr. Haultain showed (*a*) tubo-ovarian cyst; (*b*) fibroid with very unusual varicose condition of vessels. Dr. J. W. Ballantyne showed a uterus with hydatid cyst in the posterior wall. Dr. Angus Macdonald showed (*a*) fibroid removed by supra-vaginal hysterectomy (the patient took pulmonary embolism a week after operation, but made a good recovery); (*b*) fibroid uterus removed by vaginal hysterectomy (Pryor's hemisection method); (*c*) early complete ovum.

Dr. James Young read a paper on "The Minute Anatomy of the Pregnant Tube, as Illustrated by Five Cases" (see p. 118).

Dr. Haultain contributed a paper entitled "A Plea for a Rational Puerperium: A Record of 100 Cases Treated from a Physiological Standpoint."

A record of 100 cases—47 primiparæ, 53 multiparæ—was given, all of whom sat up in bed to meals on the second day after their confinement.

Forty rose from bed and sat in a chair for an hour on the 3rd day;

Thirty-five did the same on the 4th day; and

Twenty-five did the same on the 5th day.

The next day after first rising, 1 hour morning and evening was spent out of bed. The following day, 2 hours morning and afternoon. The fifth day after was practically spent out of bed entirely, with the exception of a couple of hours' rest in the afternoon.

The morbidity in all cases—*i.e.* a temperature over 100 F., or pulse over 90—for twelve consecutive hours, was three.

All cases were examined on the 10th to the 12th day, and as many as possible six weeks later. Two cases of retroversion were noted. The women were uniformly eulogistic in their commendation of the treatment.

The treatment was discussed from the point of view of the patient and practitioner, in the latter from a physiological and pathological aspect.

An attempt was made to account for the time-honoured habit of enforced rest in the recumbent position, which was considered to be founded on no physical or physiological basis, but probably on the edicts of the priesthood, who, 3000 B.C., assigned to themselves the position of obstetric specialists and enforced a varying period of confinement for "cleansing."

RECENT LITERATURE.

CRITICAL SUMMARIES AND ABSTRACTS.

MEDICINE.

By JOHN D. COMRIE, M.A., B.Sc., M.B., F.R.C.P.

Recent Work on Urinary Changes.

Glycosuria.

A CERTAIN amount of work, both of a clinical and of an experimental nature, has been done recently to advance our knowledge regarding the metabolic conditions that increase or decrease the amount of sugar in the blood, or that lead to the onset of diabetes.

Pflüger demonstrated that, in the frog, after the duodenum had been removed, or after the blood-vessels and nerves uniting this part of the intestine with the head of the pancreas had been divided, without injury to either, glycosuria was produced. Other observers believed that they had verified Pflüger's observations as regards dogs and men, by noticing that, after injury of the intestinal wall in these, diabetes showed itself. The theory advanced was that, while the pancreas secretes an anti-diabetic ferment, which afterwards passes into the blood, this process is regulated by the innervation of the duodenum. Bleibtreu [1] records two cases in which diabetes had been well marked during life, while after death no disease was found actually in the pancreas, though in one case there was a scattered fat necrosis of the duodenal wall, and in the other extensive and severe atheromatous change of its blood-vessels. These go to support the supposition that pancreatic diabetes may be set up by disease in the neighbourhood of, and not actually within the gland, a matter which demands further observation. A series of observations have been recorded in the *Zeitschrift für klinische Medizin*, chiefly by Falta,[2] upon the conditions that limit the excretion of sugar in diabetes mellitus. After having reduced his patients to a standard diet containing little carbohydrate, on which a minimum of sugar was excreted, and of which the caloric equivalent was carefully estimated, this observer increased various articles in the diet and watched the effect of doing so upon the urine. While one article was increased, the total number of calories in the diet was kept constant by reducing the other constituents, so that the increase of sugar produced could not be supposed to be due to a mere superfluity of nourishment. Contrary to what is generally held, he discovered that different cases were stimulated to excessive sugar

production by different substances, and that some were much more tolerant of an augmented carbohydrate dietary than of additional albumin or fat. For example, in two of the cases observed, an addition of 200 grammes of butter to the dietary caused a sudden and great rise of sugar in the urine, in one case so great that it was not to be accounted for by the transformation of all the fat. This substance apparently had a distinct effect in stimulating the depraved metabolic processes. In another couple of cases observed, it was found that carbohydrates were better borne than albumin. During a period when the nitrogenous part of their diet was much increased but the carbohydrates little raised, an enormous retention of nitrogen took place, and the proportion of sugar excretion to nitrogen excretion amounted to 8 : 1. Immediately a mixed diet was resumed, a nitrogen balance was regained and the sugar output also returned to its usual level. These cases were therefore more sensitive to albumin than to sugar administration. This, however, did not hold good when excessive amounts of carbohydrate were given, for when this was done, as, for example, in trying the oatmeal cure, it was found that all the carbohydrate given was excreted in the form of sugar. These exact observations help to explain how various rigid dietetic systems, such as the administration of potatoes, or oatmeal, or proteid alone, have been introduced at various times and much lauded, only to fall into discredit when further cases were recorded. It seems that most diabetics do best on a mixed diet, though in various cases different substances are specially harmful and must be so far as possible reduced. This is to be determined in actual practice by careful trial, with constant observation of the output in nitrogenous material and in sugar.

The influence of various external conditions upon the sugar output has also been studied. Experimentally, Senator[3] has continued a few observations made by Noël Paton upon the increase in amount of sugar circulating in the blood that is produced by warmth. He found that, even after exposure of rabbits for so short a time as one to one-and-a-half hours of moderate heat, a rise of the sugar in the blood by 24, 32, and 156 per cent. of its former amount took place. Nevertheless, there was never any appearance of sugar in the urine, probably because this slight increase could be disposed of by the healthy body. The influence of cold applied to the surface of the body has also been investigated experimentally by Kohler,[4] who found that, after the production of a phloridzin glycosuria in animals, as a rule much less sugar was excreted when these were exposed to a low temperature than in normal circumstances. As regards the influence of work and warmth upon the excretion of sugar in man, Stütz[5] found that both bodily exercise and overwarming of the body led to a diminished excretion of sugar in the urine of six cases that he examined.

Various influences in the onset of diabetes are discussed in different journals. Croftan[6] notices the remarkable fact that in about three per cent. of his cases man and wife were both affected. This does not necessarily indicate that the one was infected by the other, but seems to point to the idea that external influences likely to act upon both played a considerable part in the production of the disease. Further observations and statistics upon this point might be very useful. The statement with which we are familiar in text-books, that diabetes may be brought on by some psychic influence, such as a severe fright, is discussed by Roepke,[7] who denies that there is any evidence to be found in the literature of the subject in support of such a contention. While it is quite probable that such nerve injuries in some cases have been responsible for the development of a passing glycosuria or for the occurrence of diabetic coma, it is likely that in cases where a well-marked case of diabetes is discovered subsequent to an accident, the condition has long been present though unsuspected. Ehrmann[8] records a case in which diabetes appeared to originate in the onset of syphilis, but, for the same reason, namely, that the condition of the urine before the development of syphilis was not known, the case is of no value in establishing any causal relation between the diseases. Attention has repeatedly been drawn to the connection between cholelithiasis and glycosuria, associated especially with the attacks of colic, and a case is recorded by Hedinger[9] in which a woman aged 60 developed diabetes during a period in which she suffered from gall-stones with attacks of colic, but recovered completely from the diabetes after an empyæma of the gall-bladder had appeared and had been opened and drained. Naunyn has offered the explanation that the processes which lead to inflammation of the gall-bladder and ducts may also bring about a functional disturbance of the pancreas, while others have advanced the theory that the original cause of these diabetic cases associated with cholelithiasis may be inflammatory changes in the pancreas itself, with swelling of its head, which leads to secondary interference with the common bile-duct and congestion of its radicles. At all events, it is important to bear in mind that operation need not be declined in cases of cholelithiasis accompanied by diabetes, but may, as in the case mentioned above, be curative of both conditions.

Albuminuria.

The influence of posture in the production of transitory albuminuria has been discussed by several writers, and has been attributed to the mechanical condition of pressure exercised upon the kidney and its vessels by a faulty mode of standing in weakly persons. This condition, to which Jehle gave the name of "lordotic albuminuria," has been studied by Bingel,[10] who found that, in a large number of badly-developed children examined by him, it might amount to so much

as six grammes of albumin per litre, although, when the children were trained by suitable exercises to hold themselves properly, it completely disappeared. Winternitz[11] believes that the same theory explains the fact observed by him, that albuminuria is often present in those who swim in the cold, though it is not brought on by mere affusions of cold water, the lordosis being due to the peculiar arch into which the back is thrown in the usual swimming posture. Bruck[12] and Nothmann[13] have carried the matter a stage further, by experimenting on the production of albuminuria through causing patients to assume for a time such a position. Bruck found that out of 44 children, most of them in a more or less sickly condition, whom he caused to go through the simple exercise of bending backwards to grasp an object, eight developed a passing condition of albuminuria. The precipitate in an Esbach tube amounted to less than one gramme per litre in most cases, and was accompanied by epithelium and leucocytes, but few casts. Most of these children were anæmic, some tuberculous, but their urine had been under observation for some months and had formerly contained no albumin. Nothmann found that, among patients lying in bed, several developed albuminuria or showed an increase in the amount of albumin passed in the urine when a small rounded pillow of 10-15 cm. diameter was placed under the small of the back. These observations appear to form an important contribution to the question of albuminuria in young persons.

On the question of Bence-Jones's albuminuria an important paper, containing the literature of some 52 cases which have been hitherto recorded, is written by Decastello.[14] This hetero-albumose (of which the principal test is that it precipitates on heating the urine, but disappears again on prolonged boiling) is usually associated with disease of the bone-marrow, especially tumours, either myelomata, round-celled sarcomata, chondrosarcomata or endotheliomata. Strangely enough, secondary carcinomata, which are very apt to develop in the skeleton, do not seem to have any tendency to produce this albuminous body. Decastello details two cases of lymphatic leukæmia in which he found Bence-Jones's albumin in the urine, only one case having been hitherto recorded, and he discusses the manner of its production.

Wolpe[15] gives his experiences of a new reagent for the quantitative estimation of albumin, which he states is much superior to Esbach's reagent, though used in a similar manner. The composition of this reagent, which had been devised by a Japanese, Tsuchiya, is—acid. phosphor. wolframic., 1·5 grms.; acid. hydrochlor. concentrat., 5 grms.; alcohol (96 per cent.), 100 c.c.

Functional Diagnosis.

The question of diagnosing the functional ability of one or both kidneys is one which concerns both the surgeon and physician. Which-

ever method of test is employed, its use is combined with the separator, a procedure that at the present day is considered essential in order that the relative efficiency of the two organs may be clearly established. The newest method is by the use of phloridzin. A small quantity of this, when injected into the subcutaneous tissue of a healthy person, suffices to set up a temporary and harmless glycosuria. It was maintained by the originators of the test, Richter, Casper, Kapsammer and others, that when one kidney was diseased it failed to secrete glucose in proportion to the extent to which it was affected. On the other hand, Beer[16] found that in some cases the healthy kidney secreted a smaller amount than the one which was diseased. A discussion has also been carried on recently, between Blum and Prigl on the one hand, and Kapsammer and supporters on the other, regarding other defects of the test,[17] so that it appears to be one which, though interesting, is not trustworthy for practical purposes. There has been a tendency to reinstate to some extent the cryoscopic method, as applied, however, to the urine obtained by means of the separator, not to the blood as formerly. Wildbolz[18] found that this method was justified in every one of 75 cases in which nephrectomy was afterwards performed. The method of comparing the streams from the two kidneys by means of the power to excrete iodides previously administered has been recommended by Oerum,[19] while the chromocystoscopy of various coloured substances still occupies a satisfactory place with most writers on the subject as a means of rapid diagnosis.

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SURGERY.

By ALEXANDER MILES, F.R.C.S.,
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Abduction Treatment in Fracture of the Neck of the Femur.

Whitman has recently contributed a further exposition of the abduction treatment in fracture of the neck of the femur (*New York State Journal of Medicine*, May 1909). Initially he protests strongly against the haphazard methods at present in vogue, which he characterises as "apparently a compromise between the local and general disabilities of the individual, and between some treatment and no treatment." He points out the frequency with which the diagnosis is overlooked, citing forty such cases in early life out of fifty, which he has met with from a few weeks to several months after the accident. He dismisses the preconception that this fracture differs from all others, and states emphatically that, in a large number of cases, the same principles may be applied as in fractures involving other joints, viz. immediate and complete reduction of deformity, whether it is due to separation impaction, or interlocking of the fragments, and secure fixation until there is no longer danger of displacement. It is true that these conditions are more difficult to meet at the hip-joint than at any other, as direct manipulation is impossible, while the depth of the bone tells against the easy application of secure support. At the same time he claims that his method overcomes these obstacles, and the results approach more nearly a functional cure than in the most favourable class of cases treated otherwise.

According to Whitman, there are two classes of fracture of the neck of the femur: incomplete and complete. Of the former there are four varieties: (1) the classical impaction, in which one fragment is driven into the other as the result of great violence; this comparatively rare form is accompanied by severe injuries to the tissues overlying the broken bone; (2) the green-stick variety, in which the neck is directly depressed; (3) separation at the epiphyseal junction, in which the neck, held in contact with the head by the tissues on its posterior aspect, is turned forward; (4) the variety in which the fracture of the bone is complete, but the fragments are held in contact by the unruptured periosteum and capsule. This injury usually passes for an impaction, as the ability to move the limb is retained, and the deformity is slight. Radioscopic examination shows no crushing or impaction of the fragments, and the essential deformity is an absolute or relative loss of the upward inclination of the neck.

The majority of cases occurring in adult life belong to the fourth variety. In the reduction of this fracture, the first object is the fixation of the pelvis. The anæsthetised patient is placed with the upper part of the trunk on a box, and the sacrum on a secure pelvic support. Each lower limb is held extended by an assistant, and the operator supports the injured thigh. In this way the body can be kept symmetrical, and the pelvis level. Then the pelvis is fixed by the abduction of the sound limb to the extreme limit. The assistant, supporting the injured limb, flexes it slightly and rotates it inwards to the normal attitude; then, keeping up a steady traction, he slowly abducts it, the operator still supporting the thigh and pressing down on the trochanter. Under the combined influence of pressure, slight leverage, and traction, the deformity is corrected when the trochanter regains the normal relation to Nélaton's line. When the limb has been abducted to the same extent as the sound one, a well-fitting plaster bandage is applied from the upper part of the thorax to the toes; or full abduction may be maintained by suitable splints, or by traction and counter-traction.

The principle of the method depends on the construction of the joint. The neck of the femur projects upwards, inwards, and slightly forwards, forming an angle of 128°, or thereabouts, with the shaft. With the limb extended, the normal range of abduction is about 45°. At this limit, the outer and upper surface of the neck is in contact with the acetabulum; the upper extremity of the trochanter lies in contact with the muscles covering the ilium; the anterior and inferior portion of the capsule is made tense. When the angle of the neck is normal these three checks to further abduction act at the same time. In fracture, however, the deformed neck comes prematurely in contact with the acetabulum, and abduction is restricted. At the same time this contact fixes the neck, and further abduction of the limb, when the pelvis is fixed, enables one to adjust the shaft to the inner fragment at a relatively normal angle. In this position the fragments are in apposition, and after consolidation the normal range of movement is retained.

In impacted fracture, and in the green-stick fracture of early life, in both of which the neck is depressed, a greater amount of leverage is necessary to correct the deformity than in the case just considered. The neck, coming in contact with the acetabulum, furnishes the fulcrum by which one may adjust the shaft in its normal relation. In exceptional cases of impacted fracture, in which the neck is much shortened, the trochanter may abut against the acetabular rim at the commencement of abduction. Then it may be used as a fulcrum to reduce the impaction, or to withdraw the head of the bone when it has been driven through the acetabulum.

In diastasis, the neck is kept closely against the head, but is

turned forward. The same displacement may be found in adult life. It is indicated by extreme outward rotation of the limb, and by a projection below and in front of the anterior superior spine. Disengagement and adjustment are attained by flexion, abduction, and internal rotation, and the abducted limb is fixed as before. If this is unsuccessful, as it often is in children, an open operation should be performed.

In complete fracture, the pelvis is fixed in the way already described. The injured thigh is flexed, pushed gently backwards and rotated inwards, in order to disengage the fragments from the capsule and any fibres of the psoas muscle which may have been caught between them. The limb is extended till the shortening is completely overcome, and then gently abducted to a position corresponding to that of the sound limb. If abduction is performed while shortening exists, the trochanter will impringe on the ilium and act as a fulcrum to separate the fragments. The surgeon must meanwhile lift up the thigh, as it has a tendency to fall below its normal level.

With the fixation of the plaster spica, the immediate treatment of the fracture is completed in the majority of cases, and the result is not, as far as the local condition is concerned, influenced, as in other methods of treatment, by the character of the nursing. In a few cases Whitman has, in addition, inserted a temporary bone drill through the two fragments by a subcutaneous operation. As the neck of the femur slopes slightly downwards in full abduction, the direction of insertion is from a point about three inches below the apex of the trochanter, slightly forward in a horizontal direction. Regarding the further progress of the case, he emphasises the slowness of repair. Recovery can hardly be expected in less than a year, and a hip splint that permits motion without weight-bearing is a valuable adjunct in treatment.

By the abduction method, since the depression in the neck of the femur has been reduced, a range of motion sufficient for ordinary use is obtained when the restrictions due to fixation and disuse are counteracted by active and passive movements. If the limb has been fixed in the line of the body, the range of movement is impaired by the depression of the neck, which is further increased by the strain of weight-bearing, and the deformity becomes progressively worse. It is not claimed that deformity can be always perfectly reduced, or that repair will always take place. The method at least ensures the apposition of the fragments as accurately as possible, in accordance with the fundamental principle in the treatment of fractures.

Ischæmic Contracture.

Volkmann first described the ischæmic paralysis and contracture arising from the too tight application of dressings to a limb. The

majority of the recorded cases have occurred after fracture of the forearm in children. One of Volkmann's cases was due to a tight bandage on the knee for hydrops, others have been caused by the application of Esmarch bandages during an operation, or to prevent collapse after hæmorrhage.

The typical deformity is a claw hand very similar in appearance to the *main-en-griffe* resulting from nervous involvement. The wrist is slightly flexed, the proximal phalanges hyperextended, and the distal phalanges flexed, often to such an extent as to drive the nails into the palm. The condition is due to a myositis of the long flexors of the fingers. It comes on much more quickly than when the nerve has been injured, and leads to a contraction of the tendons. Lesser showed that the application of tight bandages in animals for six hours was sufficient to produce a rapid degeneration of the muscle substance. If the pressure was relieved, there was a marked effusion into the muscle, and a myositis was set up. Ultimately all or part of the muscle was transformed into fibrous tissue, according to the severity of the case. As a rule the lumbricals and interossei are not affected, hence the fingers may be extended to a greater or less degree when the wrist is fully flexed.

If the contracture is just beginning, it is better to remove the splints altogether. Lesser showed experimentally that the results so obtained were better than if the bandages were loosely reapplied. If contracture has set in, operative treatment by lengthening the tendons or shortening the bones may be carried out. Jones has suggested, and practised with success, the application of a constant force to overcome the shortening. He flexed the wrist, and was then able to draw the fingers slightly out from the palm. In this position of the hand a bent metal splint was applied to the palmar surface of each finger. In a few days it was possible to straighten the fingers a little more, and the angle of each splint was correspondingly altered till the fingers could be fully extended while the wrist was flexed. By a similar process the wrist was then extended with the fingers kept straight.

This method has given excellent results in a case recently treated and reported by Sayre (*New York State Journ. of Med.*, May 1909). Having flexed the wrist, he enclosed the whole limb up to the forearm in a plaster-of-Paris dressing. At the end of a week the fingers could be extended a little further, and a new plaster case was applied. This was repeated at the end of each week till the fingers were straight. The flexion of the wrist was then gradually overcome by a wooden palmar and forearm splint, the two parts of which were joined by a strap of malleable iron. At the same time faradism and massage of the limb were carried out, and the child was encouraged to use the fingers. By these means the movements of the fingers were well restored. It is important to remember that the rate of bone growth

is often in excess of the rate of growth of the damaged muscles, as in paralytic club-foot. In this way the contracture may recur unless gymnastic exercises are carried out during the period of growth in children.

Acute Pancreatitis.

A study of nine cases of acute pancreatitis is contributed by Musser (*Univ. of Pennsylvania Med. Bull.*, May 1909). In one case the disease was associated with renal calculus, and in another with typhoid fever. In the latter there was an absence of localising symptoms, and the presence of a leucocytosis was the only indication of a secondary infection. In the case associated with renal calculus, trauma was apparently the exciting cause, as the acute abdominal symptoms supervened a few hours after a serious driving accident. At the operation a large quantity of blood was found in the lesser peritoneal sac, and in the absence of any further details, one is justified in assuming that the case may have been one of traumatic rupture rather than acute inflammation of the pancreas. In each of the remaining eight cases the previous history of cholecystitis or cholelithiasis or of pancreatic calculi was obtained.

Vomiting occurred in all the cases, and an epigastric tumour could be made out in all but two. The occurrence of diarrhœa was noteworthy. It was present in seven cases. In one it preceded the attack by at least a month, suggesting a secondary infection of the pancreas from the intestinal tract. Signs of intestinal obstruction were absent in all. Leucocytosis was invariably present, and in four there was an acute anæmia. The temperature was subnormal, except in one case with pus in the lesser peritoneal cavity, and late in a case of gangrenous pancreatitis. Marked dyspnœa was present in eight cases, and even in one in which there was no accumulation of fluid in the abdomen. The pulse was increased in frequency, but not to a great extent. No observations were made of the fæces. Cammidge's test was positive in two cases out of four examined.

Five of the nine patients recovered, two spontaneously, and three after operation. In the former the diagnosis was based entirely on the symptoms. Of the latter, one was sixty years of age. Inflammation of and around the pancreas, and of the lesser sac, was found at the operation. Some years later the patient was in good health. One was a case of gangrenous pancreatitis, and considerable sloughing of the pancreas ensued. There was also some fat necrosis.

Of the fatal cases, two died after operation. In the others, the disease was associated with typhoid fever in the one, and with endocarditis in the other.

DISEASES OF CHILDREN.

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A MOST interesting article on "Amyotonia Congenita," by Dr. James Collier and Dr. S. A. K. Wilson, appears in *Brain*, part cxxi. vol. xxxi. The object of their paper is "to point out certain features in the condition to which attention has not hitherto been drawn, to call attention to Oppenheim's malady as a distinct and important clinical entity, and to put before the reader a complete account of all the cases which have been recorded up to the present time." "The essential diagnostic characters of Oppenheim's disease that will serve to distinguish it at once from all other diseases may be stated in a few words, which are here emphasised :—A condition of extreme flaccidity of the muscles, associated with an entire loss of the deep reflexes, most marked at the time of birth, and always showing a tendency to slow and progressive amelioration. There is great weakness, but no absolute paralysis of any muscle. The limbs are most affected, the face is almost always exempt. The muscles are small and soft, but there is no local muscular wasting. Contractures are prone to occur in the course of time. The faradic excitability in the muscles is lowered, and strong faradic stimuli are borne without complaint. No other symptoms indicative of lesions of the nervous system occur."

As regards etiology little is known. In nearly every case the paralysis has been obvious at birth, but in exceptional cases it only appeared or became much aggravated many months after birth, "and we are bound upon the present evidence to emphasise a post-natal as well as a pre-natal onset for Oppenheim's disease." The result of inquiries respecting heredity shows that the health of the mother during pregnancy was without exception good ; that in every case pregnancy continued to the full term and birth was natural ; and that in no case were signs of congenital syphilis or of rickets met with.

As already stated, in most of the cases the symptoms were noticed so soon after birth as to make it absolutely certain that the condition was present during intra-uterine life.

Clinical Aspect.—"The incidence of the disease upon the musculature is peculiar, and forms a highly characteristic feature, which serves at once to distinguish this malady from other diseases of childhood in which smallness and weakness of the muscles are associated with atonia and loss of the deep reflexes. The affection is always strictly symmetrical upon the two sides, it may be universal in distribution, but the muscles of mastication and deglutition seem always to have escaped. When the affection is general the several parts of the body are never equally affected : the lower extremities are most often and

most deeply involved, next the upper extremities, then the trunk, and lastly the face."

In the 25 cases described, the distribution in the several parts of the body was as follows :—

	Involved.	Normal.	Not noted.
Face	3	20	2
Trunk	22	3	...
Upper extremities . . .	20	5	...
Lower „ . . .	25	...	...

In this condition there is no local muscular atrophy comparable to the local atrophy which is characteristic of all cases belonging to the group of the myopathies.

Musculature.—The condition of the affected muscles is one of complete tonelessness, but however complete the apparent paralysis may be, yet every muscle, when put into a favourable position as regards work involved, contracts voluntarily.

Along with the extreme limpness of the muscles there is associated also considerable relaxation of the ligaments, and consequently marked over-extension of the joints may occur. The hands are long and narrow, and the feet long, narrow and pad-like. "Very striking and peculiar to amyotonia is the impossibility of distinguishing by the touch between the skin, the subcutaneous tissue, and the underlying muscle. One can make no separation between these structures, and from the skin down to the bone there seems to be but one soft homogeneous substance."

"It seems that those muscles that are more closely concerned in the vital processes—muscles that are employed in sucking, swallowing, and in respiration—tend to escape in amyotonia, for in all the cases in which the face has been affected it has been especially noted by the authors that sucking, mastication and swallowing were well performed, and in none of the cases has it been noted that the diaphragm or the intercostal muscles were weak. From the fatality of bronchial affections among the cases it is probable that the muscles of respiration are in some degree at fault."

Attitude.—"The inability to hold the head erect is conspicuous in severe cases : the head rolls round anywhere upon the circle which its attachments limit. If the little patient be placed in the sitting position the body bunches up generally when the trunk is affected. The usual attitude for the lower extremities at rest is that of slight flexion and marked external rotation at the hips, flexion at the knees—the calves being in contact with the hamstrings—and extreme dorsiflexion at the ankle, the plantar aspect of the long, pad-like foot being turned upwards." In only 1 case among the 25 reported cases was there conspicuous affection of the face.

Electrical Reactions.—"A tardy response to faradism, with more or less normal galvanic reaction, is so characteristic of amyotonia, and so infrequent in other diseases in childhood, as almost to deserve the name "amyotonic reaction." This peculiar reaction seems to be present in some degree in all the muscles of the amyotonic patient, but it is most marked in those muscles which are most affected. A remarkable peculiarity, possibly connected with the muscular affection, is the ease with which these little patients bear the strongest faradic stimuli. They are quite unperturbed at a strength of current that is unbearable to the ordinary person."

General Nerve Signs.—The deep reflexes are invariably lost in the regions where the amyotonia is marked, but, apart from this and the indifference of these children to strong faradism, no distinct nerve signs are discoverable.

Course.—Slow, spontaneous improvement hastened under appropriate treatment is universal throughout the cases.

Diagnosis.—The characteristic condition is readily diagnosed when the three chief symptoms—strictly symmetrical flaccidity, weakness without complete paralysis, and loss of the deep reflexes—are kept in mind, but differentiation is occasionally called for from two classes of cases. "The first group comprises those cases of obstetrical paralysis in which a severe injury to the spinal cord has occurred in the course of parturition, and the second group is that of infantile acute spinal muscular atrophy of familial type."

As a rule the diagnosis can be readily made, but "a question of great importance, and one that must be discussed at length, is whether this disease is to be considered as a variety belonging to the group of the myopathies, or whether it is a clinical and pathological entity entirely separate from the myopathies."

"We hold, however, that the group of cases which has been brought together under the name of amyotonia congenita is clinically quite distinct, and has not as yet been proved to be associated with the myopathies. We base our opinion upon the following facts:—

"(1) The myopathies are conspicuously familial diseases, whereas no familial tendency has been recorded in amyotonia.

"(2) The several types of myopathies often show familial relationship one with another, whereas no case of amyotonia has been reported in a myopathic family.

"(3) A large majority of the cases of amyotonia are congenital, the condition being obvious at birth; in a minority of the cases the amyotonia has appeared acutely and has reached its most severe degree in a few days. In none of its several types is myopathy apparent at birth, nor does it ever appear acutely and reach a maximum in a few days.

"(4) The characteristic muscular flaccidity of amyotonia is not present in myopathy.

"(5) The local muscular wasting that is a marked feature of myopathy is not present in amyotonia.

"(6) The course of myopathy is one of progressive increase of the muscular weakness, that of amyotonia is one of progressive amelioration of the symptoms.

"(7) Return of the deep reflexes after their persistent absence for months or years has been recorded several times in amyotonia, and has occurred in two of our cases under our observation. Such a return of an absent deep reflex has never been recorded in myopathy."

Treatment.—Massage, passive movements, and attention to the general nutrition are the chief elements of successful treatment.

Pathology.—"The pathological changes which underlie the condition of amyotonia congenita have not been subjected to such investigation as will allow of an unequivocal statement as to their nature. Up to the present time three autopsies have been made, and the results published in two of the cases only." In Spiller's case (*Univ. Penn. Med. Bull.*, January 1905) the results, shortly stated, were: "(1) The absence of any appreciable abnormality in the peripheral and central parts of the nervous system; and (2) the intensity of the muscular regression in the affected regions. Definite lesions of the thymus gland and of the hæmo-lymphatic system were present."

The important points emerging as a result of Baudouin's examination (*La Sem. Med.*, 22nd May 1907, p. 241), were:—

(1) Changes in the external group of the anterior horn cells.

(2) Smallness of the anterior roots suggesting arrest in development.

(3) Abnormality of the peripheral nerve trunks, suggesting an arrest of development of the nerve fibres.

(4) Intense sclerosis and regressive changes in the muscles.

(5) Marked sclerosis of the thyroid gland and of the thymus gland.

MENTAL DISEASES.

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The Ductless Glands in Relation to Mental Disease.

At the Congress of French-speaking Alienists and Neurologists held at Dijon last August, Prof. Laignel Lavastine submitted an important report on psychical affections due to disturbances of the ductless glands (*L'Enceph.*, October 1908, p. 398). A very full bibliography and historical review forms the introduction. Then the psychical symptoms seen in diseases of the thyroid, parathyroids, thymus,

pituitary, suprarenals, ovaries, testicles, and prostate are described. In summing up these the author comes to two conclusions.

1. The frequent coincidence of mental affections in disturbances of these glands is a fact.

2. It is also evident that all psychical disturbance presupposes a cerebral predisposition, at least a quite special affinity of the morbid agency for the cortex.

In a number of cases the occurrence of the two series of disturbances is a coincidence; in others, however, the two stand in the relation of cause and effect. In the latter the determination of this relation is not always easy. In some it can be referred to the effect which the glandular trouble has on development, anomalies of structure resulting. In others the glandular disturbance induces correlative modifications in both the organic and psychical life. In yet others the disease of the gland produces, along with grave organic troubles, intense cerebral reactions always manifested by the mental confusion characteristic of the toxic psychoses.

The second part of this report is devoted to a study of glandular disturbances in the psychical syndromes. For convenience this is considered under three heads—cerebral debility, acute insanities (mania, melancholia, and confusion), and dementia (general paralysis, dementia præcox, epilepsy, senility). A chapter is devoted to the study of glandular troubles in neuro-psychic syndromes, epileptics, the nervous, hysterics, neurasthenics, and psychasthenics.

In conclusion the author submits the following propositions:—

1. There is a causal relation between the disturbances of the ductless glands and certain recognised mental syndromes, such as myxœdema, exophthalmic goitre, etc.

2. Is there a causal relation between these same disturbances and certain psychical troubles accompanying their respective syndromes?

3. If there is, to which of these psychical troubles can one attribute a glandular origin, and by what criterium?

4. Granting the part played by cerebral predisposition, can one admit the possibility of a glandular origin in certain cases of cerebral debility, dementia præcox, partial delirium, functional nervous troubles, hysteria, neurasthenia, psychasthenia?

The opinion of the Congress was in favour of agreeing to the first proposition, in regarding the second as probable, and the last as possible.

Catatonia and the Thyroid Gland.

Another paper closely related to the preceding one is that by Prof. Berkley and Dr. Hollis (*Amer. Jour. of Insan.*, January 1909, p. 415). It is so striking a communication that it was noticed even in the daily papers. In eight cases of catatonia the thyroid was

partly excised, and in most of them a cure of the mental disease was effected. In the others there was a very decided improvement. This surgical procedure was suggested to Prof. Berkley by the similarity of a number of the symptoms of Graves's disease to those of catatonia. Full details of all the cases, both before and after operation, are given. The authors admit that the number of cases is too small upon which to base positive conclusions, and also that the condition of the thyroids, which were examined after excision, was not uniform. They, however, urge that a cure in some, and a marked improvement in the remainder, of eight consecutive cases of catatonia, cannot be explained in any other way than by attributing it to the treatment employed. The influence of the parathyroids is still unknown. It is suggested that the beneficial effect of the thyroidectomy may be due to the influence this organ exercises on the leucocytosis of the blood. After the operation a high leucocytosis follows, and this may produce good results in various ways. It is also possible that the influence of the thyroid on general metabolism may come into play, as it was noticed that all the patients increased very substantially in weight. The cases they operated on were all of not long standing, and they are of the opinion that the results would not be so good had patients been treated who had been longer ill. In them probably organic cortical changes take place which preclude the possibility of complete recovery.

Four cases of the same disease were treated with doses of lecithin and thyroid gland in alternate weeks, and three showed at least decided improvement. These results are encouraging, but in view of the small number of cases tried the real value of the treatment cannot yet be estimated. No doubt the authors and others will make further use of both this and surgical treatment, and when the results are placed on record a sound opinion of their value will be forthcoming.

The Ductless Glands in Epilepsy.

Still another investigation of the ductless glands has been conducted by Prof. Claude and Dr. Schmiergeld (*L'Encéph.*, January 1909, p. 1). Their researches were confined to epileptics, of whom seventeen were examined. Their attention was directed to the subject by the results of previous observations of the relation of epileptic crises to the condition of these glands. They took the precaution of examining these glands in other cases, so as to familiarise themselves with the appearances of the normal and pathological states. A brief account of all the cases is given. They were all women, mostly between twenty and thirty-five, others older.

The task of drawing conclusions from their observations was not an easy one. This was due in part to our present ignorance of the

normal physiology of these glands, and in part to the various changes they found. Of one fact they are assured, that in all cases of epilepsy the ductless glands show some modification of structure. These modifications are not of the same intensity in all cases, but in none were they found healthy. The thyroid is the most frequently affected. It is small and is usually sclerosed, but changes may occur in all its constituent tissues, connective tissue, epithelium, colloid substance, and vessels. The condition of the parathyroid glands is not uniform. In the same subject one may be atrophied and sclerosed, another normal, and a third hypertrophied. The significance of these changes, in view of the present want of knowledge of their structure and function, is still uncertain. The pituitary and suprarenals did not present any constant change, though most of them were not healthy. The ovaries in most cases gave indications of functional insufficiency. The pancreas was normal in nearly all cases. The liver and kidneys showed the effects of disease due to accessory causes. Though the conclusions to be drawn from their observations may be slender, great praise is due for the care and thoroughness of their work. Even negative information is often in the end very valuable in pointing the way to the satisfactory solution of a problem.

The Pathological Anatomy of Dementia Præcox.

In this paper (*L'Encéph.*, December 1908, p. 656) Drs. Klippel and L'Hermitte give details of the examination of the brain in three cases of dementia præcox. Their conclusions are that certain changes are primary. These are, a regressive atrophy of the nerve cells of the deepest layers of the cortex and a disappearance of their processes. As a result, proliferation of the neuroglia cells in this region sets in. Other changes are secondary, such as meningo-vascular lesions and the ordinary hæmorrhages due to excitement. But these are not always present. In most cases atrophy of the cerebellum is found.

Studies in the Cytological Variations of the Blood of the Insane.

In this research by Prof. Lepine and Dr. V. St. Popoff (*L'Encéph.*, December 1908, p. 574), fifty-two patients were examined and many blood counts made in each case. The value of the results is, therefore, as the authors state, rather based upon the changes which occur in the mental state of one individual than upon the characters of the blood in different forms of mental disease. The investigation was most complete, including not only the cells of the blood, but the percentage of hæmoglobin, the arterial pressure, the renal permeability, and a quantitative urinary analysis. The leucocytes were classified as follows:—Small, medium, and large mononuclears (basophile), inter-

mediate (including those with reniform nuclei) polynuclear neutrophiles, eosinophiles, and diverse forms. The counts were made so as to exclude the digestive period, with very few exceptions. The conclusions they arrived at were :—

Red Corpuscles.—In most cases there is anæmia, varying from 3,800,000 to 4,500,000. This was due to hæmolysis dependent on the cause of the mental disease, occasionally to hæmorrhages, sometimes to digestive disturbance. In a few cases there was an excess of red cells, due as a rule to concentration of the blood, especially in general paralytics. In a few it appeared to be due to thyroid excitation. In very many cases there were signs of intense and abnormal renewal of the red corpuscles. These resembled on a smaller scale the phenomena observed after severe loss of blood.

White Corpuscles.—Leucopenia below 6000 is uncommon. If below this figure it was usually transitory, and a precursor of an increase. As a rule there is a hyperleucocytosis, from 12,000 to 15,000, apart from all treatment or any particular organic cause. The leucocytosis is further subject to oscillations both in amplitude and rapidity. In chronic cases there is a tendency to an increase of mononuclears. Polynucleosis may exist to a high degree, and is an index of an energetic organic reaction. There are, however, exceptions to this. It is the rule in general paralysis. Eosinophilia may be entirely absent, and varies in the same patient in an astonishing way within a few hours. It is usually the precursor of some decided mental change. Changes with respect to other forms of leucocyte did not appear to the authors to be of much significance.

Their conclusions as to the relations of various forms of leucocytosis to mental diseases are as follows :—

Acute or subacute curable cases.—At first the condition is variable, but tends to a mononucleosis, with oscillations, usually quite irregular, in a few partly regular, towards an excess of eosinophiles or polynuclears, or both together. In many cases the cause of this oscillation is quite obscure. They consider it established that oscillations artificially produced by the injection of colloidal silver salts or nucleinate of soda show a possibility of recovery.

Cases with a subacute or chronic organic element without a tendency to recover show normal leucocytosis, chiefly mononuclear, without oscillations. They exhibit like change after the above injections. Eosinophilia tends to be permanent.

Cases without any important organic element and incurable show a normal formula, with no spontaneous nor artificial oscillations.

General paralytics usually manifest a polynucleosis without variations.

In all cases they are of opinion that an individual count is of little value. It is the presence or absence of change which is the important point. Their conclusions are not of so much use for diagnosis as for prognosis.

DERMATOLOGY.

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Multiple Hereditary Telangiectases causing Hæmorrhage.

Hanes (*Bull. Johns Hopkins Hosp.*, March 1909, Baltimore) directs attention to this remarkable disease, which is either rare, or at least has been seldom recognised. He describes eight typical instances occurring in two unrelated families, and reviews all previously recorded examples, and provides excellent coloured and other illustrations. The complaint may be defined as an hereditary affection manifesting itself in localised dilatations of capillaries and venules, forming distinct groups of telangiectases, which occur especially upon the skin of the face, nasal, and buccal mucous membranes, and give rise to profuse hæmorrhage, either spontaneously or as the result of trauma. Three factors seem of etiological import; namely, heredity, repeated traumatisms, and the abuse of alcohol. Of these, the first is by far the most striking and constant, and can be traced in an ascending as well as a descending direction. Males and females are alike affected, and both are equally capable of transmitting it. Repeated traumatisms appear to play a part in the production of the telangiectases. The localities mentioned, to which may be added the finger tips, are those particularly exposed to such. The causative relation of the abuse of alcohol is rather a personal impression of the author, but the vaso-dilator action of alcohol on the peripheral capillaries goes to support this view. The telangiectases are prone to assume the spider-nævus formation, and these on section show wide spaces lined by a single layer of endothelium lying immediately subjacent to a greatly attenuated epidermis, affording scanty protection. Hæmorrhage is the one constant feature of the disease, and the source of all other symptoms. In the majority of cases it takes the form of epistaxis, but this symptom may be entirely wanting. The bleeding regularly originates in telangiectases. The hæmorrhages are astoundingly profuse; patients describe the blood as spurting from the injured spot, and the nose may bleed several times a day. Secondary anæmia follows as a natural sequence. Multiple telangiectases constitute the sole characteristic sign of the affection. While most constant on the nasal and buccal mucous membranes, and the muco-cutaneous junction of the lips, they have been seen on the face, hands and feet, scalp, conjunctivæ, and once post-mortem in the gastric mucous membrane. At first bright red, they acquire in time a violaceous or purple tint. They are true developmental faults, beginning in early

childhood, frequently causing increasing annoyance during adolescence, and becoming serious menaces to health towards the evening of life. There exists no reasonable diagnostic difficulty. The specific mistake of regarding the condition as hæmophilia has been made repeatedly, but is rather an error of interpretation than of observation, though the coexistence is conceivable. The therapeutic indications are clear. Destruction of the culpable telangiectases should be the first consideration. A bead of chromic acid fused upon a probe is an excellent cauteriser, and its action can be checked at any time by the application of an alkali. Repeated cauterisations may be necessary, especially within the nose, for here the bleeding often takes place from very small telangiectases which are easily overlooked. The patient should be instructed to report for treatment, if possible, each time the nose bleeds. It is futile to treat the secondary anæmia so long as the hæmorrhages continue. Remove the cause, and the effect is readily amenable to treatment. Hanes suggests as a suitable designation the term *Hereditary Hæmorrhagic Telangiectasia*, as adequately describing the condition.

Eczema under and between the Toes.

Eczema of the toes is characteristically one of the purely local forms, and generally occurs independently of manifestations elsewhere. Ruggles (*Journ. Cut. Dis.*, March 1909, N. Y.), from notes of six cases, concludes that the condition develops slowly. The patient, if observant, notices that the contiguous surfaces of the third, fourth, and fifth toes, less often of the second, and very rarely of the great and second toe, periodically peel, associated with slight irritation. New epidermis forms and is desquamated, but the peeling process increases in frequency and severity, and a considerable area of macerated cuticle, bleached and sodden, is shed at once, leaving a tender, violaceous cut is exposed.

Itching is most conspicuous on taking off or putting on the footwear, and fissures appear. Spontaneous cure may occur, followed by relapses, particularly in winter, when perspiration is lessened. A peculiar sensation, described as "half itching, half smarting," noticed only at night, or on rising, is premonitory of a fresh outbreak. When fully developed the whole under surface of the toes becomes raw and denuded. In his experience it is most common in brain workers, and not in those of the labouring classes, in whom, *a priori*, one would have anticipated its advent. Those who have habitually cold feet seem predisposed, and wearing patent leather shoes or boots appears contributory. But the predominant factor in causation seems to be the presence of a broken-down *tranverse* arch of the foot, that located at the distal ends of the metatarsal bones, whose integrity is normally maintained by the inferior transverse metatarsal ligament. This brings the contiguous surfaces of the toes, especially of the outer three, into

too close approximation. The first interdigital space is wider than the others, hence its usual immunity. Badly shaped, narrow shoes have likewise a share in its origination. In treatment, great cleanliness, cotton stockings, and wide, well-fitting, orthopædic shoes, provided with a transverse convexity to maintain the toes in normal position, are essential. The local management consists in washing the feet once or twice daily in cold water, and, after drying, painting the affected surfaces with a solution in alcohol of tannic acid, 10 per cent., and salicylic acid, 2 per cent. This acts well as a prophylactic should the peculiar pruritic sensation, referred to, threaten. For some cases, and especially for those in which enough fissuring exists to render the application of the lotion painful, an ointment, consisting of 10 per cent. of ung. picis liq. made up with zinc oxide and cold cream, is preferable, at least till the condition is so much improved as to permit the lotion to be resorted to.

Eucerin, a New and Improved Ointment Basis.

There is a long step, with few intervening barriers, between lard, plain or benzoated, and eucerin. Liebreich in 1885 noted the capacity which the grease from sheep's wool possesses of absorbing water, and attributed this property to the presence of fats of the cholesterin, as contrasted with those of the glycerin series. Lanoline extracted from this, introduced in 1897, he regarded as a pure cholesterin fat, and ascribed its hydrophile qualities to this circumstance. Lifschutz, however, not fully satisfied, took up the investigation, and found that when all the free cholesterin was removed, though the cholesterin fat remained, the resulting mass had no appreciable absorptive capacity for water. He discovered that this property resided in a special alcohol contained in wool fat, and to this he attached the name of alcohol-fraction 2. According to Unna (*Medizin. Klinik*, Nos. 42, 43, 1907, Berlin) this alcohol exhibits the following characteristics. It is readily soluble in ordinary menstrua except water, and at the usual temperatures is of honey-like appearance and consistence, but at low temperatures it stiffens into an opaque amorphous substance. One per cent. of this added to vaseline is sufficient to impart to it a water absorptive capacity of from 150 to 200 per cent., and two to three per cent. increases this to 300 per cent. and over. It is true that, if to lanoline, which has a hydrophile index of 160 per cent., a double quantity of such a fat as benzoated lard is added, which itself has only an index of 10 to 17 per cent., the combination can take up 250 per cent., and retain it in much looser incorporation than does lanoline alone. Lanoline is viscid, tends to harden if exposed to the atmosphere, has a peculiar odour *sui generis*, and may manifest a liability to decomposition. Experiments on natural and artificial cholesterin fats showed quite an inconsiderable hydrophilia. Unguentum paraffini, with 5 per

cent. of this wool-fat alcohol, absorbs from 500 to 550 per cent. of water. Now cold cream—ceratum Galeni—possesses certain advantages as an ointment basis over other fatty vehicles. This was long ago recognised by Bulkley. But the cold cream of the shops has no uniform formula, and as usually sold is defective in keeping qualities; in course of a month it grows rancid; the contained water separates in cold weather, or evaporates. Eucerin, to be obtained from Mielck, Schwann-Apotheke, Hamburg, consists of one part of wool-fat alcohol and twenty of ung. paraffini mixed with an equal weight of water. It is soft and without smell. Without any further addition eucerin is itself an excellent unguentum refrigerans an improved cold cream. But in combination its usefulness can be almost indefinitely extended. Thus equal parts of eucerin and liquor plumbi diacetatis, plain or diluted, may be used in place of the watery lead lotion so frequently employed for inflamed surfaces, in all cases at least where the application of continuous moist dressings is not well borne. Again, equal parts of eucerin and liq. ammoniæ is an admirable sedative for insect bites. A 3 per cent. solution of peroxide of hydrogen with an equal part of eucerin is suitable for bleaching the hair or blackheads on the nose. Cooling pastes can in like manner be prepared, such as 25 per cent. of carbonate of magnesia in eucerin, which is a cooling ointment and cooling powder in one, of wide applicability. Eucerin can be advantageously used as an addition to ordinary ointments, to which it imparts special cooling properties, or the ointments themselves can be even better compounded with eucerin alone, as eucerin 8, oxide of zinc 2, forming a good and stable zinc ointment. Eucerin 5, precipitated sulphur 2, oxide of zinc 2, terra silicea 1, forms a useful zinc sulphur paste. Eucerin 5, oxide of zinc and starch, each 2·5, resembles Lassar's well-known paste. It is the best excipient for tumenol.

More recently (*Monatsh. f. prakt. Dermat.*, 15th March 1909, Hamburg), Unna has discovered the value of eucerin in the treatment of ichthyosis. At one time regarded as incurable, ichthyosis, at least in its milder forms, has been found amenable to remedies. In particular, glycerin and glycerine of starch have proved beneficial, but possess the drawback of imparting a stickiness to the skin, and producing a sensation of chilliness, due to the hygroscopic properties of glycerin. From the observation of several cases, Unna has determined that washing with salicylic soap, and subsequent inunction with eucerin or eucerin cold cream, persevered in for a few weeks, suffices to restore the integument to a normal state. How far this is quite permanent on discontinuing the procedure, time is yet required, but it serves to indicate that eucerin is something more than a mere cold cream ointment basis.

The Nasal Origin of Lupus Vulgaris of the Face.

Opinions are still divided as to whether lupus vulgaris of the face begins in the skin itself, or in the mucous membrane of the nose, and affects the skin secondarily. That, in the vast majority of cases of lupus of the face, lesions are present in the mucous membranes of the nose and mouth, is undoubted. Caboche (*La Presse Méd.*, 27th September 1907, Paris) is of opinion that practically all cases start in the mucous membrane and affect the skin secondarily. He studied 22 cases from the point of view of site of infection. In 16 cases there were both skin and mucous membrane lesions, in 5, lesions in the mucous membrane but not in the skin, and in only 1 case, skin lupus with no definitely tuberculous lesion in the mucous membranes. This last case suffered from ozæna and atrophic rhinitis, which the author suggested might be tuberculous in nature. He quotes a similar case of Lambards', in which, after an injection of tuberculin, there was a general reaction, with a local reaction in the nose, causing great congestion of the mucous membrane and epistaxis. Therefore allowing that the last case of Caboche's was tuberculous in nature, all his cases showed tuberculous lesions in the mucous membranes. He holds that the tubercle bacillus gets in through the nasal mucous membrane, and spreads by the lymphatics to the skin. There is usually a definite tuberculous lesion in the mucous membrane, but that is not essential, as the bacillus may pass through the lymphatics of the mucous membrane without infecting them, and only produce lesions when it reaches the glands or the skin. He likewise points out how the lymphatics from the anterior part of the nasal mucous membrane run, following the same course as the lymphatics of the skin of the face. These are divided into three groups, viz. an upper, ending in the pre-auricular and parotid glands; a middle, in the sub-maxillary gland; and a lower group, ending in the sub-mental gland or glands. Besides these, along the lymphatic chains of the face, are several minute glands, of which there are two groups, a lower over the buccinator muscle, and an upper set which are sub-orbital and lie in the fold between the nose and the cheek. Any of the groups of glands may be attacked by tuberculosis in the course of lupus. Caboche cites cases where lupus of the skin followed a tuberculous adenitis of one or other of these glands. He also points out that the sites where lupus usually starts in the skin are exactly over the situations of these groups of glands, viz. nose (from sub-orbital gland), cheek, pre-auricular region, over the lower jaw and in the sub-mental region. He also instances cases where lupus of the face followed scraping of a tuberculous lesion in the interior of the nose, and also where an amelioration of the nasal lesion was followed by a gradual cure of the skin lupus. This, he maintains, shows the intimate lymphatic connection which exists between the

skin and the nasal mucous membrane. When the bacilli have spread to the glands they may infect the skin with lupus, either by causing a suppurative adenitis with fistulæ and secondary infection of the skin, as is frequently seen in the sub-mental and pre-auricular regions; or the bacilli may spread directly from the gland (which can be felt to be enlarged) to the overlying skin. The important practical point to be learned from the observations of Caboche is, to pay particular attention to the treatment of the mucous membrane in all cases of lupus of the skin of the face.

NEW BOOKS AND NEW EDITIONS.

A Text-Book of General Pathology for the Use of Students and Practitioners. J. Martin Beattie and W. E. Carnegie Dickson. London: Rebman, Ltd. 1908.

A Text-Book of Special Pathology for the Use of Students and Practitioners. J. Martin Beattie and W. E. Carnegie Dickson. London: Rebman, Ltd. 1909.

It is a remarkable fact that students of pathology in English-speaking countries have long been at a great disadvantage as compared with their continental brethren. The latter have always had access to an ample choice of text-books, written by eminent exponents of the subject, many of which books are now regarded as classics and referred to as the landmarks of the state of knowledge of their day. The British student, especially, perhaps, the Scottish student, has been almost entirely dependent on lecture notes for his information. Such few text-books as were available hardly met his difficulties, and he has been left to supplement the shortcomings of his notes in the best way he could. It is needless to say that the want of a suitable, elementary, and yet comprehensive text-book, abreast of the knowledge of the day, has long been keenly felt. Such a want has been the cause of a great increase of the initial difficulties of the student and a great hindrance to the development of pathological study. In Scotland, Glasgow has produced a text-book and Aberdeen another, but hitherto none has emanated from the University of Edinburgh. Hence the work of Drs. Beattie and Carnegie Dickson will be welcome, perhaps in a special manner, to Edinburgh students. It has been written at the suggestion of Professor Greenfield and with his co-operation, and may therefore be regarded as an authoritative exposition of his teaching.

It must not, however, be looked upon as a mere synopsis or reproduction of the University lectures. On the contrary, it bears throughout all its sections the impress of independent thought and investigation, which render it not only of value to the student commencing the study of the subject, but also to the practitioner seeking special information.

On turning over the pages of the volumes, one is immediately struck by the beauty of the numerous illustrations. Of these there are 359 in all (6 of them in colour). They have been made almost without exception from the authors' own specimens and preparations, or from others to which they have had access. The reproduction of

most of the photographs represents in our opinion the high-water mark of this kind of work, and the authors, the artists and the publishers all deserve unstinted praise for the infinite trouble which must have been taken to insure such a high standard of excellence. It is no exaggeration to say that, in many of the illustrations, complicated histological details can be followed with as much clearness as if the microscopical sections themselves were under the eye. Both those representing finer microscopic and naked-eye preparations have been selected with such judgment, and are so numerous and complete, that a careful examination of them, along with the text, is almost tantamount to attending a practical class on the subject.

An examination of the work itself confirms the impression derived from the character of the illustrations, that it is one eminently suitable to be put into the hands of students, that it is calculated to serve as an introduction to the study of pathology, and that at the same time the practitioner will find it full of information and, owing to the arrangement of the text, remarkably easy to consult.

In the first volume the opening chapter, of some 30 pages, is devoted to the consideration of the cell in health and disease. It gives an exceedingly clear account of the structure, anatomy, physiology, chemistry and pathology of the cell. The question of structure of the cell is discussed with great fulness of detail, which the student may, perhaps, at first find somewhat difficult to grasp, but which will subsequently be of the greatest assistance to him in his study of the pathology of the cell. The description of mitotic division and its various modifications is also very complete and clear.

In the remainder of this volume the retrogressive processes, disturbances of the circulation, inflammation and repair, the progressive tissue changes and animal parasites are discussed, the volume ending with a valuable chapter in which the various theories on the difficult subject of immunity are presented in a manner which the reader will find very easy to follow. The authors have omitted all consideration of bacteriology, giving as their reason the fact that this subject is fully dealt with in the many excellent manuals that are now to be had. We think that their decision is to be regretted. In an introductory text-book of pathology it is practically essential that the student should have presented to him in some immediately accessible form a comprehensive, though not exhaustive, account of the various more important pathogenic organisms. We think that much of the space occupied in this and other pathological text-books by the description of various animal parasites might well be given up for this purpose. There are now numerous sources of information with regard to these animal parasites, a detailed knowledge of which should not be expected of the junior student.

The chapters on inflammation and repair and upon tumours call

for special comment. Both of these bear particular evidence of original work and careful editing. The special attention which one of the authors (Dr. Beattie) has given to the subject of inflammation and repair has enabled them to present very fully the modern work done upon it. Adami's classification of tumours has been adopted practically in its entirety. Possibly this is a wise change, but to those accustomed to the older methods of classification, the rearrangement and the introduction of numerous new terms of Greek origin, which do not bear their own explanation, will render the following of the new classification a matter of considerable difficulty. Apart from this, the chapter upon tumours is one of the best in the book. It is at once clear and concise, and in this part of the work the aid of the illustrations will be much appreciated. Under the circulatory disturbances, the authors have done ample justice to the subject of infarction, the knowledge of which in this country Professor Greenfield has done so much to promote.

In the second volume diseases of the various systems, including the nervous, osseous, articular, and muscular systems, are considered. So far as the limits of space allow, the most important diseases are satisfactorily dealt with, but it is to be hoped that the authors will see their way, when they produce their second edition, to greatly amplify this part of their work, so as to allow a fuller consideration of morbid processes likely to be of special concern from the practical point of view of clinical medicine. This need impresses us more especially in connection with the account of the genito-urinary system. This system is so important to the pathologist and to the clinician that the fullest knowledge of it and of its relationships to other organs of the body is essential. It would be very desirable that the subject of Bright's disease should receive more extended treatment.

In the chapter on the nervous system the authors state that they regard the relationship of syphilis and locomotor ataxia as doubtful. The nature of the relationship may be still *sub judice;* its existence can hardly now be open to doubt.

It is not our intention, however, to search out individual errors in the book. Such must certainly be present more or less in a first edition, and it would be ungenerous, and would give an altogether unfair perspective to the value of the work, if those were singled out and insisted upon. We would rather desire, after careful reading of the book, to emphasise our appreciation of the high ideal which the authors have set before them, and of the great measure of success they have attained in reaching that ideal. We congratulate them on the appearance of their work, and would express the hope that they will soon be in a position to give us a second and more extended edition.

A System of Diet and Dietetics. Edited by G. A. SUTHERLAND, M.D. Pp. 893. London: Henry Frowde. Hodder & Stoughton. 1908. Price 30s. nett.

THIS addition to the Oxford Medical Publications forms a goodly volume, excellently printed, and light to handle. We give it a most cordial welcome, and we are certain that every practitioner who invests in it will find it constantly valuable as a reference book. The twenty-eight chapters are written by nineteen contributors, most of them men distinguished for special knowledge of their subjects. Sir Lauder Brunton shows his philosophic breadth of view and his out-of-the-way knowledge in the introductory article on general principles, and Harry Campbell expounds his well-known views on the evolution of man's diet through various periods, most attention naturally being given to the effects of cooking and agriculture in modifying it. He comes to the conclusion that the ideal diet should contain a proportion of animal food, but that "it is not possible to attempt the construction of a stereotyped dietary for man, nor would it be advisable, since his dietetic adaptability is an advantage to the race." In the article on alcohol, the same writer takes up the positions that the germ-plasm is not influenced by parental alcoholism, and that alcohol is an improver of the race, by eliminating the unfit. As has been often shown, it is unfortunate that, in doing this, so much damage is done to individuals and families who persist. While the modern results of experimental work on the effects of alcohol are fairly stated, and the extremely limited range of its usefulness is pointed out, Campbell does not ban it altogether, either as beverage or medicine. In dealing with arterio-sclerosis, the same writer acknowledges his obligations to William Russell, whose views and dietetic suggestions he adopts. Lastly, in treating of diet in old age, Campbell advises extreme moderation, simplicity, and the avoidance of soft, starchy foods, and points to the harm done in such cases as the obese bronchitic and the atheromatous with high pressure by over-feeding.

E. I. Spriggs gives an admirable sketch of the physiology of digestion, and in another chapter we have from him the results of recent experimental work on diet. A most valuable section deals with the composition of food materials, the analyses being selected from Atwater and Bryant's work. Almost any food in any usable form has its value tabulated as to percentage of water, protein, fat, carbohydrates and ash, and, finally, its full value per lb. in calories. Another useful table gives the weight of food yielding 100 calories, and physicians are advised to weigh out the commonly used foods according to the table, in order to see the amounts of each which are of equal food value.

An excellent chapter by Bardswell and Chapman treats of diet in

tuberculosis. The chief results have been published in a monograph, but many will be glad to have this account for reference. Many diets are given, and special importance attaches to the way in which the question of economy in feeding has been dealt with. Any one who masters this chapter, including the portions dealing with laryngeal tuberculosis, hæmoptysis and tuberculosis of intestines, will have in his possession some very wide-reaching practical knowledge. Cautley gives analyses of the numerous patent and proprietary foods with which we are so familiar. Francis Boyd deals concisely with artificial methods of feeding, and shows that only a quarter of the necessary nutriment can be got by rectal feeding; hence its value is greatly restricted. A surgeon cannot hope thus to put a case of pyloric obstruction in a more favourable state before operation. Ker deals fully with the very important subject of diet in fevers, and H. P. Hawkins with the dietetics of disorders of stomach and intestines. The Editor himself does the chapters on diseases of the lungs and the feeding of children both in health and disease. Wherever we have sampled the work, we have found satisfaction in its thoroughly practical character and its interesting style. There is no work of the kind in our language so likely to prove useful to all members of the medical profession.

Parcimony in Nutrition. By Sir James Crichton-Browne. Pp. 111. London: Funk & Wagnall's Co. 1909. Price 3s.

This expansion of a Presidential Address is a counter-blast to the new teaching whose ablest exponent is Professor Chittenden. It is, as one would expect, clever, racy, and readable, but in spite of the evidence adduced from most varied sources—ancient Greece, Japan, universal experience of civilised mankind, prison dietaries, and so forth—one who has read Chittenden's work must feel that his conclusions can only be disproved by methods of an equally scientific character.

A Practical Treatise on Disease in Children. By Eustace Smith, M.D. Third Edition. Edinburgh and London: Wm. Green & Sons. 1909. Pp. xxiv. + 833. Price 21s. nett.

Twenty-odd years ago the student who wished to study disease in children was pretty sure to be sent to Dr. Eustace Smith's "Treatise" for the best and most interesting clinical descriptions and for the freshest and most suggestive ideas on the subject of treatment. To the many who have kept that book by them as a trusted adviser in the difficulties of practice, it will come as good news that the distinguished

author has, after a long interval, brought out a new edition embodying the results of his very extensive experience. The volume before us is not a mere reprint, for something like a quarter of its contents will be found to consist of new matter. The accounts of symptoms are mostly, we are glad to see, unaltered, the pathological details have been considerably curtailed, and large additions have been made in the sections dealing with diagnosis, prognosis and treatment.

To those who have yet to become acquainted with Dr. Smith's "Treatise," we have much pleasure in recommending it. Of its value as a clinical text-book it would be difficult to speak too highly, the descriptions of disease are so life-like, and the directions as to treatment show so much first-hand knowledge both of the drugs that are given and of the children who get them. Though perhaps not quite suited on account of its size for the student's use, the book is one which the practitioner—especially the experienced practitioner—will know how to value.

Lectures on Diseases of Children. By ROBERT HUTCHISON, M.D., F.R.C.P. Second Edition, Revised and Enlarged. Pp. 426. London: Edward Arnold. 1909. Price 8s. 6d. nett.

THE general scope of Dr. Hutchison's excellent book remains very much as in the first edition. Some additional lectures, as well as fresh illustrations, are, however, included, and serve to increase the value of the work. The literary ability of the author adds to the whole a finish but rarely found in medical text-books.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES AND NEWS.

The British Medical Association Meeting at Belfast.

YEAR by year it seems as if the annual meeting of the British Medical Association were becoming a more elaborate function, and the labour of organising it and carrying it through correspondingly greater; and yet each year the local members of the Association, whose lot it is to do the work, seem to accomplish their task with more and more success. Those who were fortunate enough to be present at the meeting at Belfast will long remember the hearty welcome and lavish hospitality which was extended to them, and the perfection of all the arrangements made for their comfort. Queen's College was entirely given up to the Association, so that there was ample accommodation for all the sectional meetings, museum, exhibition of surgical instruments, etc., in one centre—a great convenience for which the members of the Association have reason to be grateful to the College authorities.

In some respects Belfast might be said to be almost too attractive a place for a scientific meeting, for, owing to the counter-attractions provided by visits to the vast industrial works in the town, the multiplicity of social functions, and the dangerous proximity of several excellent golf courses, the temptation to hurry over the strictly scientific work was severe. On the last day of the meeting there was a specially large exodus of members to take part in a most enjoyable golf competition at Newcastle, County Down, for a cup generously presented to the Association by the Belfast members, and some of the sectional meetings were seriously depleted thereby.

As regards the scientific work, it may be said, speaking generally, that the time allotted was all too short for adequate consideration and discussion of the large number of interesting papers presented, and it is a matter for regret that the sectional meetings are not carried on in the afternoon as well as the morning.

Of the work done, it is not possible to speak in detail. While there was an absence of anything startlingly new or revolutionary, a great deal of solid work was offered for discussion. Interest centred largely on the various aspects of the tuberculosis problem. The Address in Medicine delivered by Dr. R. W. Philip was an able exposition of the question as it stands at present, and many must have heard with

interest and relief his optimistic views on the possibility of stamping out tuberculosis in the near future. The compulsory notification of phthisis was strongly advocated in the Section of Hygiene, while in the Surgical Section a more specialised discussion on the treatment of tubercular joint disease took place, in which belief in the efficacy of conservative measures was very generally expressed. The institution of a special section of Hæmatology and Vaccine Therapy proved a successful innovation, fully justified by the amount of interesting work presented there.

A notable feature of the meeting was the keen interest taken in the proceedings by His Excellency the Lord Lieutenant of Ireland and the Countess of Aberdeen, whose presence at many of the social functions as well as at some of the sectional meetings was a gratifying recognition of the important part played by the British Medical Association in promoting the common weal, and of the interest which attaches to its deliberations.

Outdoor Schools.

THE practice of teaching in the open air is not without precedent. In hot climates it has been the custom for centuries for the pedagogue to gather his pupils around him for instruction, not within four walls, but under the canopy of heaven. Even in our own clime it was not unusual, in the old parish schools, for some of the classes in summer time to be conducted out of doors. But the idea of establishing regular outdoor schools, whose primary object is the improvement of the health of delicate children, is modern, and Germany has the honour of being the first to put this educational innovation into practice. It is not many years since the first open-air school for weakly and tubercular children was opened at Charlottenburg, and the results obtained with comparatively simple equipment have been so remarkable that widespread interest in the experiment has been aroused, and the example set is already being widely followed. Our contemporary, the *British Journal of Tuberculosis*, in its issue for July, has a number of articles dealing with the outdoor school movement. From these we learn that the movement is making rapid progress in Germany, England and America. Excellent illustrations are given of the London and the Boston (U.S.A.) schools.

In some cases the school is built in a suburb, or just outside a town, and the children pass the entire day at school, but return home in the evening to sleep. In other cases, sleeping accommodation is provided, and the children live in the school. It is obvious that the latter plan is likely to be the more efficient, as the children will have the benefit of fresh air, and clean and quiet surroundings, for the whole twenty-four hours, instead of spending the night in dwellings often of a most unsatisfactory kind. The extra expense is not so great as might be expected, as the children, in any case, receive all their food at school. The essential

part of the school building is a roof to provide shelter in bad weather; but whenever possible the classes are held actually outside. The buildings are of a substantial kind, but are stated to cost about two-fifths less than ordinary school buildings.

The routine of a school day at Boston is described as follows:—"The children arrive at the school at 8.30 A.M. and have their breakfast. After breakfast, all but four are ready to begin lessons. These four, remaining in the dining-room, clear the tables, wash and dry the dishes, &c. The time between breakfast and dinner is devoted to the regular grade work, divided into twenty-minute periods, and exercises. At 12.30 P.M. dinner is served, and again the children help to set tables and wait at table. After dinner they are required to remain quiet, and sleep if possible for one hour, and then their regular school work is again taken up. At 4.30 P.M. a light supper is served, and at 5 o'clock the children return home.

"Cleanliness is insisted upon, and one of the rules of the school is that faces and hands must be washed before meals, and teeth brushed after each meal."

If a child does not seem well, lessons are omitted. The diet is simple but varied, and is liberal in quantity, the total value of the daily food being nearly 3000 calories for each child.

The preparation of food for the children attending outdoor schools furnishes a good example of the economy of labour which may be effected by co-operative cooking, for Dr. Rose tells us that "at Bradford some six or seven persons, with the help of the newest machinery, provide, without undue effort, 4000 scientifically prepared dinners daily."

The educational, as well as the medical, results of a stay in an outdoor school are stated to be highly satisfactory. The time actually devoted to definite "lessons" is rather less than in the ordinary day-school, but the classes are much smaller, and the children appear to make fully as much progress as they would have done in the day-school.

We may refer those who desire fuller information to the recently issued report of Dr. Kerr to the Education Committee of the London County Council. London has now four open-air schools, and Dr. Kerr calls attention to the enormous increase in weight and the marked improvement in the percentage of hæmoglobin which results from attendance at one of these schools.

Medical Evidence in the Law Courts.

THERE is a great difference in the value attached to the opinion that is sought for and that which is volunteered. When a patient seeks the opinion of a doctor and pays for it, he is prepared to be impressed and is inclined to act on the advice given; when a medical man volunteers

advice in social circles, it carries little weight—in fact, no one except a hypochondriac gives it serious consideration. The same difference is observed, although from other reasons, when an expert appears in the witness-box: he has not been asked *by the Court* to give an opinion, but appears on behalf of one of the parties to the case. Is it surprising, then, that his opinions are not received with the same respect as if they were delivered in the consulting-room or at the bedside? and if he cites cases from his own experience in support of his views he must not expect them to be accepted unreservedly. It is, of course, very trying for a medical man to have his statements received with scepticism, made, as they are, upon oath, and founded upon his personal experience; but his position as an *ex-parte* witness lays him open to this. It is interesting to contrast the manner in which an expert witness's opinions are received, with the deference which is attached to a statement in a so-called "standard" text-book. The difference is largely due to the bias or partisanship which is an inherent feature of expert evidence. Doctors when they appear as expert witnesses are naturally prejudiced in favour of one side of a case, and are almost incapable of seeing the other; so long as they continue to be so, so long will they continue to deserve the reputation meted out to them in the Law Courts. We believe it would be in the best interests of the profession if doctors abstained from giving opinions in Courts of Law except in regard to patients who have been under their own care, and when they do give evidence, they should be provided with notes of the cases they propose to cite as being likely to bear on the points at issue.

The Autumn Post-Graduate Course.

JUDGING from the number of entries, the post-graduate course, which commenced on the 30th August, promises to be at least as popular and well attended as its predecessors, and there is the further evidence of the appreciation in which it is held that there are several entries from men who have taken out the course on previous occasions. The list of members of the surgical course, which is limited to twenty-five, was filled up nearly a month ago. There are still some vacancies in certain of the limited classes of the general course, which commence on the 13th September.

PELLAGRA.

By R. DODS BROWN, M.D., M.R.C.P., D.P.H.,
Assistant-Physician, Royal Asylum, Edinburgh,
and
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Assistant-Physician to the Skin Department of the Royal Infirmary, Edinburgh.

As, so far as we have been able to ascertain, only one case of pellagra has been previously recorded in Great Britain, we think the following case is worthy of publication.

The patient was an unmarried woman aged 21 years, who was admitted to the Royal Edinburgh Asylum on 13th July 1908, under the care of Dr. George M. Robertson, to whom we are indebted for permission to publish the case. She was born in Shetland, and had lived there all her life. She had been employed at home during the winter months in doing house-work and in looking after a grocer's shop. In the summer months of 1905, 1906, and 1907 she was engaged in the fishing industry, principally in gutting and salting fish. She was accustomed to a plentiful and varied diet, except when she was employed in fish-gutting, when she subsisted almost entirely on bread and tea. Her mother informed us that she never at any time worked with or ate maize, but during the last winter and spring she sometimes handled oatmeal and rice, and had formed the habit of taking mouthfuls of these substances in the raw state. Her mother does not think that she ate any great quantities of the rice or oatmeal. The patient had suffered from spasmodic asthma for more than ten years.

The family history was good, except for the fact that a maternal aunt had suffered from puerperal mania.

Previous to the commencement of the present illness she was of a bright disposition and very industrious. In June 1907 she complained of feeling ill and out of sorts, but she still continued her usual occupation. Menstruation ceased at that time, and did not recur till August 1908. In December 1907 she consulted a doctor on account of nasal catarrh and sore throat. In March 1908 the condition of the nose still persisted, and she began to complain of weakness in the knees. She was treated at that time for bloodlessness. In May 1908 she had difficulty in walking, and suffered

from attacks of diarrhœa. At this time she began to feel very nervous, and became morbidly depressed. She was easily agitated and very emotional. In June she was confined to bed on account of the weakness of the legs, and she began to complain of pain in the lower part of the back, the pain being so severe that she could not sit up in bed. She was unable to sleep without some hypnotic. In the middle of June she passed from a state of depression into one of excitement, talking and singing incessantly without any marked mental confusion, although she became occasionally mildly delirious. These symptoms persisted for five days, when she became quieter and rational, but still complained of severe pains in the back. A week or so later she began to refuse her food, saying that she did not require it. She also had delusions that she required an immediate operation because of a throat affection, and that she was being poisoned. In this state she was admitted to the Royal Asylum.

State on Admission.—The medical certificates under which she was detained stated that she was delusional, believing that her father was poisoning her with tobacco smoke, and that her mother was going to murder her; also that she had hallucinations of sight and hearing, and that she was restless, emotional, and wanted to be born again.

Examination of the patient showed that her mental condition varied between a feeling of well-being, at which times she laughed and talked readily, and one of depression, when she cried without any apparent cause, and expressed the delusions that she was about to be chloroformed, and that some person was endeavouring to murder her. She had auditory hallucinations.

Her physical health was very poor. She was thin and anæmic and her whole condition and appearance suggested that she was suffering from a severe toxæmia. There was slight intention tremor in the hands and arms. She was unable to walk or stand or to sit up in bed without support. She suffered from severe pain in the back, especially in the lower dorsal and lumbar regions. Spasticity of both legs with exaggerated knee-jerks was well marked.

The pupils were equal in size, regular in outline, and reacted readily to light and accommodation.

Stomatitis was present to a very severe degree, and on account of this it was with difficulty she was induced to take any nourishment. She complained of a burning sensation in the mouth and throat, and constantly demanded water to drink. The tongue was

dry and coated, and there was a tendency to diarrhœa. Nothing noteworthy was found in the respiratory or circulatory systems.

The pulse rate was 78, while her temperature was 98 .

The white blood corpuscles numbered 5800 per c.mm.

There was a septic vaginal discharge.

The urine contained a trace of albumin.

The face was the seat of an eruption which extended all over the forehead, cheeks, nose, chin, ears, and upper part of the neck. The distribution corresponded exactly to the areas which are exposed to the light. The eruption stopped with an abrupt outline at the upper part of the neck, and on the forehead at the hair margin. The eruption was red, with a good deal of brownish pigmentation. For the most part it was dry and scaly, but here and there were areas which were oozing and covered with yellowish-green crusts. The dry areas were red-brown in colour, somewhat scaly, and did not feel infiltrated. The affected area was slightly raised above the normal skin, and at the edges the active eruption extended almost as far as the brown pigmentation. The eruption somewhat resembled, except for the distribution, a seborrhœic dermatitis with superadded pigmentation, but the eyebrows were not so scaly and inflamed as one would have expected in a seborrhœa. The scalp also was quite healthy. The conjunctivæ were unaffected.

On the backs of the fingers and hands, and extending on to the backs of the wrists and lower parts of forearms, the skin was markedly pigmented, being of a peculiar rich chocolate-brown colour. The colour was evenly distributed, gradually fading at the upper margin. The palms of the hands showed no pigmentation nor thickening. The finger-nails were normal and looked very white in contrast to the pigmented fingers. Between the thumbs and index-fingers on both sides were moist, oozing areas, and on the palm of left hand two flaccid blebs full of clear fluid. Around the blebs the skin was peeling off slightly. On the dorsum of each great toe was a streak of pigment similar in colour to that seen on the hands. There were no inflamed areas on the feet, the soles being quite normal. There was a small brownish-red scaly area over the lower end of the sacrum.

Two days after admission she became definitely emotionally depressed and agitated, frequently crying, and asking to be allowed home. She had delusions of persecution and also of identity.

An examination of the cerebro-spinal fluid showed no increase of the cells or of the globulin.

The mental state just described persisted for four days, when she passed into a condition of delirious insanity. She became more confused, noisy, incoherent, disoriented, and very restless. The auditory hallucinations became more marked, and she now had visual hallucinations also. She was sleepless and restless at night. Occasionally she became less confused and quieter, and sometimes she talked rationally, but only for a very short period, when she frequently complained of severe pain in the back and in the frontal region of the head. The physical condition of the patient was now very weak.

The stomatitis was unaffected by treatment, and diarrhœa was very obstinate. The temperature tended to rise to 100° or 101° in the evening, and her pulse, the rate of which was from 74 to 80 per minute, was very weak.

The mental symptoms persisted for seventeen days, after which she became clearer, and the motor excitement subsided. She still laboured under delusions of persecution and identity.

Physically she was in a state of great prostration. Her tongue and mouth were still affected, and her temperature tended to rise in the evening.

The diarrhœa continued to be very troublesome. The heart's action was extremely weak, and seven days before she died she had an attack of syncope. She took very little nourishment.

She got steadily weaker, and died one month after admission.

A post-mortem examination could not be obtained.

There can be no doubt as to the diagnosis in the above case. The patient presented all the classical features of pellagra. There were the three typical sets of symptoms, viz. nervous, gastro-intestinal, and cutaneous. The case began with mental depression, headaches, and general lassitude, and later was associated with delusions and hallucinations, and ended, as many cases do, with attacks of delirium. The mental symptoms in pellagra vary very much in minor details, but all are associated, especially in the early stages, with some degree of mental depression. The delusions, as in our case, are very often associated with the alimentary tract, *e.g.* fear of poisoning, &c. The pain in the back, of which she so constantly complained, is also very characteristic. The spasticity of the lower limbs, with exaggerated reflexes, is the rule in the early stages, but may be followed later by loss of the reflexes.

The gastro-intestinal symptoms were also very pronounced. The persistent diarrhœa is an important feature, as also the inflamed condition of the mucous membrane of the mouth, and the

constant feeling of thirst, and the burning sensation in the mouth and throat.

The cutaneous changes were typically those of pellagra. One of us had the good fortune four years ago to see a series of casts made by Dr. Henning from cases of pellagra in the Austrian Tyrol. These casts have since been published by Merk. The eruption seen in our case on the face and hands was identical with these. The distribution on face and hands is characteristic. At first glance it looks somewhat like a severe sunburn, but the colour of the eruption is different from the ordinary sunburn. Sunburn does not show the peculiar brown tint which is seen in pellagra. Exposure to the sun is an important factor in the production of the eruption, which usually appears first in spring or summer, and disappears in winter, to reappear in the following spring. The fact that the skin eruption came out whilst the patient was in bed, and not exposed to the sun, is not against a diagnosis of pellagra, as numerous cases are on record where the eruption has first appeared during the winter, and in patients who are entirely confined to bed. Similarly, the eruption frequently occurs in parts, especially the feet, which have never been directly exposed to the sun's rays.

The distribution of the eruption on the backs of the hands and face is the same as one often sees in erythema multiforme. If blebs are present the resemblance to that disease is still greater, but the longer duration of the eruption and the rapid development of the dark-brown scaly condition make the resemblance only a superficial one.

The causation of pellagra has led to much discussion in countries where the disease is common. In a recent article by Nicholas and Jambon, the cases are divided into two groups.

1. True Pellagra, which is undoubtedly due to the ingestion of damaged maize, and which is endemic in certain parts of Italy, Spain, the Tyrol, Roumania, Egypt, and the United States.

2. Sporadic or pseudo-Pellagra, in which maize forms no part of the dietary, but where the condition is due to general debility from poverty, insufficient nourishment, bad hygienic surroundings, alcoholism, and cachexias, *e.g.* advanced tuberculosis, &c.

In both the true pellagra and the pseudo-pellagra the clinical picture is identical. Both forms of the disease occur only in the very poorest classes, where the food taken is either inferior in quality or quantity. In the cases which are due to eating bad maize most authorities are agreed that the disease is due to the

growth of a fungus or fungi belonging to the group of aspergilli or penicillia, which by their growth on the maize produce toxic bodies, which by their absorption cause the symptoms. These toxines have been extracted by Lombroso and others, and when administered to animals they have produced skin changes, gastro-intestinal symptoms and paresis, with convulsions ending in death. Administered to man, they produced nausea, loss of appetite, diarrhœa, asthenia, and erythematous eruptions on the skin.

The gastro-intestinal symptoms in pellagra are said to be due to the effect of the toxine on the spinal and sympathetic nervous systems, and not to any direct action on the intestinal mucous membrane.

Our case must be looked upon as belonging to the class of cases of sporadic pellagra due to insufficient or bad food and bad hygienic surroundings. The patient had never eaten maize, but the fact that she was in the habit of eating raw oatmeal and rice is important.

Dr. Imrie, under whose care the patient was, informs us that maize is not used as an article of diet in Shetland, but that a kind of barley called bere, which is grown locally, is sometimes used instead of wheat flour.

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HIRSCHSPRUNG'S DISEASE ("IDIOPATHIC" DILATATION OF THE COLON).

By D. P. D. WILKIE, F.R.C.S.

THE name idiopathic dilatation of the colon, originally given by Gee to the condition which is discussed in the following pages, is an unsatisfactory one, in that while aiming at being descriptive it is so vague as to permit of somewhat free interpretation. In studying the literature of the subject it early becomes evident that the term "idiopathic" conveys to different minds different ideas, so that from the outset one has to work within ill-defined limits.

The Italian synonym "megacolon congenito" is more definite, but it implies more than is justified by our present knowledge of the disease. Probably the German name, Hirschsprung's disease, is as good as any, for it is frankly non-committal as to etiology, in regard to which certainty is as yet impossible.

By Hirschsprung's disease we understand a dilatation, with hypertrophy of the walls, of the whole or some part of the large intestine, no organic obstruction of the bowel distal to the dilated portion being present. This dilatation and hypertrophy is usually, not always, most pronounced in the pelvic colon, and is frequently limited to that portion of the great gut. The degree of the dilatation and hypertrophy is generally very great before the condition is recognised, and the dilated coil of bowel frequently appears to fill almost the whole abdominal cavity.

The condition is usually met with in young children, many of the cases reported being under one year of age, but cases have presented themselves for treatment at almost all ages, and one of the cases which I had the opportunity to study was that of a man over sixty years of age.

Pronounced constipation, dating from birth or shortly after birth, characterises the condition, and abdominal distension and enlargement are marked features. The majority of the recognised cases have died in early childhood from intestinal toxæmia or from acute enteritis. It is not uncommon, however, to find the disease in older children.

The fact that quite a number of cases have been met with in adults past the prime of life shows probably that milder degrees of this condition may cause so few symptoms during childhood and early adult life as to escape notice, and only when the

degenerative changes of old age begin to set in does the malady assert itself. At present it is almost impossible to form an accurate opinion as to the frequency with which this disease occurs, as it is only within recent years that its existence has been recognised. It is a significant fact, however, that in each successive year a larger number of cases is reported than in any previous year, and the total number in the literature now exceeds 120.

All statistics go to show that the disease is much commoner in boys than in girls. Duval collected forty-five cases, and thirty-six of these were in boys. Later statistics entirely support this proportion.

Since Hirschsprung in 1888 published his first two cases of this malady, and for the first time gave a clear and precise clinical picture of the disease, quite a considerable literature has accumulated on the subject, and very numerous and varied theories have been brought forward as to its etiology. Such diversity of opinion exists among competent observers that one is almost driven to the conclusion that the dilatation and hypertrophy of the colon which we associate with the name of Hirschsprung may be caused by any one of several factors, and that no one cause will be found which will account for all the cases reported.

One may here indicate briefly the various views which are held in regard to its etiology, and at a later stage enter more fully into this part of the subject.

1. "The dilatation and hypertrophy are truly congenital." This view is strongly held by Hirschsprung himself. Mya called the disease "megacolon congenito." Concetti calls it "megalocolie." Kredel describes it as "eine Art Riesenwuchs des Colon." Generisch, Griffith, Sternimann and Neugebauer all support this view.

2. That abnormal length and sling formation of the pelvic colon, with or without secondary kinking, volvulus or valve formation, is responsible for the condition. This view has very numerous supporters, among whom may be mentioned—Jacobi, Broadbent, Morgan, Duhamel, Johanessen, Neter, Frommer, W. Bergmann, Baginski, Mulberger, Bittorf, Delkerkamp. This may be called the "anatomical theory."

3. That an abnormally long pelvic meso-colon with secondary twisting of the pelvic colon is the cause. This view has not obtained much support, but is brought forward by Borth, Gourévitch and Schuckmann.

4. That there is congenital aplasia of the muscular coat of the intestine with secondary distension. This is the "ektacolie" of Concetti; Berghniz supports this view.

5. That there is a weak tonus of the muscular coat of the colon, the result of defective innervation. "Neuropathic dilatation and hypertrophy," Hawkins calls it. Bing is a strong supporter of this view, and Lunn, Fitz and Lennander also favour it.

6. That spastic contraction of the lower part of the colon, or of the sphincter ani, cause dilatation and hypertrophy above. Fenwick, See, Hitchin, Drew and Schreiber bring forward evidence to support this view. Wilms believes "functional spasm of the sphincter ani" to be the cause.

7. That it may be caused by a primary inflammatory alteration in the wall of the colon. Griffiths is the only advocate of this view.

8. That there is congenital narrowing of the rectum or the lower part of the pelvic colon. Treves first advanced this view. Hobbs and de Richmond and Gruneberg support it in a slightly modified form.

9. That in some cases inco-ordinated muscular action of the colon, similar to that present in congenital pyloric stenosis, may be the cause (J. Thomson).

Morbid Anatomy.—The condition of parts is best studied from below upwards. The anus is normal, and the rectum is, as a rule, normal. In some cases the rectum has been found very roomy and dilated. Hawkins believes that the dilated colon always ends by a funnel-shaped narrowing, and that this funnel-shaped part is in many cases the upper half of the rectum. Lately, however, several observers have noted that below the greatly enlarged pelvic colon the rectum was found in a contracted state, suggesting muscular spasm.

Treves in one case found what appeared to be a congenital narrowing of the rectum in almost its entire length. He expressed the opinion that this state of affairs would probably be found in every case, but it has not been found either before or since his publication.

Generally the dilatation begins just above the rectum, but the lower 2 to 3 inches of the pelvic colon may remain unaffected, and in one or two reported cases the pelvic colon has been of normal size, and the dilatation has been higher up. As a rule, the pelvic colon is found enormously enlarged, having the form of a single loop extending upwards into the abdomen and also slightly to the right—in many cases extending up to the right costal margin.

The posterior surface of the pelvic meso-colon then comes to look forward, and *vice versâ*.

Generally the loop of pelvic colon rises completely out of the pelvis, but in some cases the lower part of the loop has been found wedged in the pelvis and apparently exerting a valvular action over the upper end of the rectum. In one or two cases the pelvic colon has not extended so far upwards in the abdomen as its size would have led one to expect, but has filled up the hypogastric and right iliac regions. Shortness of the pelvic meso-colon probably accounts for the position of the bowel in such cases.

In the fully-developed condition the dilated and hypertrophied bowel reaches enormous proportions, so that on opening the abdomen it conceals all the viscera (with the exception of the liver) from view. It may have a diameter of from 6 to 8 inches, and in many of the reported cases it is described as having the proportions of a man's thigh.

In one or two cases reported as this condition there has been found a localised sac-like dilatation of the pelvic colon. Probably it were more correct to classify such cases along with intestinal diverticula than as Hirschsprung's disease.

In most cases the dilatation has gradually ceased as the iliac and descending portions of the colon were reached, but in quite a considerable number the descending colon has been dilated.

Less frequently has the transverse colon been found enlarged, and still less frequently the ascending colon and cæcum. At least two cases have been reported, however, where the maximum of dilatation and hypertrophy was found in the transverse colon, and where the pelvic colon was not appreciably affected.

The small intestine invariably appears quite normal in size and structure.

Apart from its great size, the most striking feature of the affected portion of bowel is the great thickness and hypertrophy of its wall, the bowel usually having the appearance of a dilated and abnormally thick-walled stomach. This increased thickness of the bowel wall is chiefly due to an enormous hypertrophy of the circular muscle coat.

In long-standing cases the bowel has a tough, leathery consistence, and in these cases there is found considerable fibrous hyperplasia in its wall, and evidence of "chronic interstitial colitis."

Ulceration of the mucosa has been noted in not a few cases (at least one case has been reported where death was due to the perforation of such an ulcer), but it is not the rule. When present,

the ulcers are generally numerous, irregular in shape, and extending down to the circular muscular coat. They are usually found at the most distended portion, and have thus been given the name "Dehnungs-Geschwüre" (Kredel). Ulceration has been more frequently found in cases where the dilated colon contained hard scybalous masses than in those where the content was almost exclusively gaseous.

The content of the dilated colon varies considerably in different cases. In the majority it is gaseous, with scanty semi-solid faeces; in a fair proportion, however, the colon has been found filled with a solid mass of hardened faeces weighing many pounds, and from one or two cases smaller very hard masses, almost meriting the name of enteroliths, have been removed.

Microscopic Appearances.—If there be no ulceration present, the mucous membrane shows only some degree of leucocyte infiltration, indicating a state of chronic irritation. The muscularis mucosæ is usually slightly hypertrophied. Some leucocyte infiltration of this layer is the rule, and interstitial fibrous changes are frequently seen. The submucous coat always shows a much denser and more fibrous structure than normal, its blood-vessels are more numerous, and round them lymphocytes are collected in great numbers.

The circular muscular coat always shows an extreme degree of hypertrophy, being frequently four to five times its normal thickness. This increase in thickness is due to a true muscular hypertrophy, the muscle fibres being larger and more numerous than normal.

Leucocyte infiltration of this coat is generally seen, and its blood-vessels are increased both in size and number. In old-standing cases the muscle may be replaced to some extent by dense connective tissue fibres.

The longitudinal muscular coat generally shows some degree of hypertrophy, but is rarely more than twice its normal thickness.

The serous coat invariably shows some degree of fibrous thickening.

Symptoms and Signs.—The clinical picture presented by the disease is a typical one, but it varies according as to whether the compensatory hypertrophy of the bowel is sufficient to overcome the dilatation or not. Thus we find cases which run a more or less acute course, compensation being quite inadequate.

Others again are so well compensated that they present few symptoms, whilst in others compensation is not quite sufficient, and they run a chronic course, with every now and then an attack

of more acute symptoms, and in any one of those attacks a fatal issue may ensue. There are certain symptoms, however, which are present in greater or less degree in all cases, and which, taken collectively in a young person, are almost pathognomonic of this disease. These shall be considered first.

Constipation is characteristically present, and almost invariably dates from birth. Generally it is of a pronounced type, and it is not uncommon to get a history that the bowels have not acted for several weeks. In many recorded cases there was no motion for four to five days after birth, in spite of purgative medicine given by the mouth, and an enema was required to procure a motion. This constipation persists, the child constantly requiring opening medicines and injections, and in many cases never having a natural motion. When the child is weaned the constipation becomes still more pronounced. A feature of the constipation is that it does not yield, as a rule, to purgative medicine given by the mouth, but much more readily to a large rectal injection. In some cases the insertion of a small piece of soap per anum has procured a motion. In spite of a very marked degree of constipation the stools may not be hard and scybalous, but, as a rule, are small, soft and semi-solid, and frequently very offensive. In some cases, however, a great quantity of hard scybalous fæces may collect in the colon, and small hard masses may be passed from time to time.

Flatulence and abdominal distension are always present in some degree. The distension of the abdomen is generally noted shortly after birth, usually within the first three to six months, but it may not be sufficient to attract attention till much later.

In only one case (Escherich) has a swollen abdomen at the time of birth been noted by a competent observer, although in four other cases—those of Hobbs and de Richemonde, Mya, Futterer and Middeldorpf, and Schmidt—there was a history of abdominal enlargement at birth.

Duval collected twenty-nine cases where the time of appearance of the abdominal distension was noted—

In the first few days of life	12 cases.
In the first month	2 „
In the first six months	6 „
In the first year	4 „
In the second year	1 „
In infancy	4 „
	29 cases.

The degree of the distension may be enormous, and may seriously interfere with respiration. In practically every case it is a very striking feature. Borborygmi are often a troublesome symptom; in one case they were so loud as to be "heard all over the house." Many cases constantly pass flatus, in others large quantities of flatus are passed at intervals. The flatus is usually very offensive, and may create a positive nuisance (Kredel). Patterning of the abdomen is another symptom (see later). Nutrition is always impaired, the patients are always spare, and frequently emaciated.

In a case running an acute course, the picture resembles, in many respects, that of a fairly acute intestinal obstruction, but the patient may survive for many weeks.

Constipation is extremely obstinate, nothing short of enemata procuring an action of the bowels, and even injections frequently failing to bring away anything but a little flatus. Such a case differs from one of acute intestinal obstruction, in that a little flatus comes away from time to time, and this fact is often helpful in the differential diagnosis. Respiration becomes rapid and laboured from the upward pressure on the diaphragm. Vomiting may be a troublesome feature, but may be absent altogether. Seldom, if ever, does it become fæcal in character.

The patient emaciates rapidly, has a sallow, poisoned look, and is often drowsy and listless from toxæmia. In some cases there are spasmodic attacks of cramping, abdominal pain, suggesting some obstruction, such as a volvulus or kink, and at these times the enlarged colon may stand out in rigid spasm.

In such cases, if the condition is not relieved by passage of a long rectal tube or by operation, death results from toxæmia, or from the perforation of an ulcer. In some cases acute colitis supervenes, with profuse diarrhœa and a rapidly fatal issue.

In the chronic type of case one finds obstinate constipation, abdominal distension, and great flatulence, but there is seldom any vomiting, and the patient is able to go about. He has usually a sallow appearance, and suffers from fits of lassitude, the result of constant absorption of toxins from the colon. Appetite for food generally remains good, sometimes, indeed, is abnormally large, but nutrition is always poor. Regular rectal injections may be required to procure a motion. Large quantities of flatus are passed from time to time. There may occasionally be a little blood in the stools, indicating that some ulceration is present.

Such a case is very apt at any moment to develop the

symptoms of the more acute type, and sooner or later, from degeneration occurring in the hypertrophied muscular coat, compensation gives way, obstructive symptoms set in, and death results from toxæmia. Such cases seldom reach adult life.

In compensated cases the only symptom is the chronic constipation. The abdomen is slightly enlarged, but does not attract particular attention. Such a case may improve during childhood, and live a tolerably healthy life till the age of forty or fifty years. Then, compensation beginning to fail, the symptoms of either of the above-mentioned types may set in, and may carry off the patient.

Physical Signs in a Well-developed Case.—The great abdominal enlargement is the most striking feature. The shape of the abdomen is characteristic. It appears greatly lengthened vertically when contrasted with the shortened thorax, and the swelling appears to be, and as a rule actually is, greater in its upper than in its lower half.

The greatest circumference of the abdomen is found at the infracostal plane, and the lower ribs are raised and pushed outwards, the costal angle being greatly widened out. There is usually special bulging and prominence on the left side below the umbilicus. Considering the size of the abdomen, its anterior wall is often remarkably lax, indicating the chronicity of the enlargement. In cases of the acute type, however, the skin may be stretched, and tense and dilated superficial veins may be seen.

Intestinal patterns are often visible as the dilated colon goes into peristaltic spasm. Usually a great loop can be made out, extending from the left iliac fossa upwards into the right hypochondriac region. In chronic cases the patterning is often much less definite, and takes the form simply of a slowly occurring change in the contour of the abdomen.

The percussion-note over the dilated colon is generally tympanitic, as the intestinal content is almost entirely gaseous; in rarer cases it may be dull, however, as in them the bowel is distended with solid fæcal matter.

The liver dulness is often displaced upwards to a marked degree, likewise the cardiac dulness. Rectal examination reveals the absence of any organic obstruction. Sometimes the rectum itself is large and roomy, in other cases it may be compressed by a distended portion of pelvic colon lying in front of it in the true pelvis. Spasm of the sphincter ani has been described, but is certainly very exceptional.

Swelling and œdema of the legs has been noted in one or two cases, and even slight general cyanosis, the result of impeded and restricted respiratory action, has been observed.

Albuminuria has been noted in several cases, and in one case hæmaturia occurred regularly when the colon was more than usually distended. In this latter case the emptying of the greatly distended colon by the passage of a rectal tube was always immediately followed by the passage of large quantities of urine; evidently a condition of hydronephrosis, from pressure on the left ureter, was present.

The prognosis varies according to whether the case presents itself for treatment in the mild and moderately compensated stage of the condition, or in the advanced stage, with an enormous colon. Taken as a whole, the prognosis in this disease is a gloomy one, and the death-rate is very high. Some writers put it as high as 85 per cent. In any case, there can be no doubt that a child suffering from the condition lives, as it were, on the edge of a precipice, and is liable to be carried off rapidly by one of several conditions, chief among which are acute obstruction, acute colitis, and pneumonia; and should it escape these it may die from slow toxæmia and wasting.

Concetti collected thirty cases with a view to finding out the prognosis. In nine of these cases the result of treatment was unknown, as they were altogether lost sight of. Of the remaining twenty-one cases, nineteen died, two lived. Thirteen of the fatal cases died within the first three years of life.

It is thus evident that the time of greatest danger is the first few years of life, and that if a case can be tided over those early years its chances are much better. The explanation of this fact probably is that the child with sufficient compensatory muscular hypertrophy of the bowel passes safely through those dangerous years, and compensation, once established, remains good.

In addition, however, as Hirschsprung himself pointed out, some cases may improve with the advance of years on account of the normal process of development of the large intestine, particularly the fixation of the cæcum and the drawing in of the pelvic colon by the shortening of its mesentery.

There can be no doubt that with the greater knowledge we now possess of the pathology and treatment of this disease, a better prognosis can now be given than would have been, say, ten years ago. Of thirty-seven cases which one has been able to collect from recent literature, a fatal issue ensued in nineteen. This shows a

death-rate of just over 51 per cent., a much more hopeful outlook than that presented by the older statistics.

Cases.

For permission to use the following five cases I am indebted to the kindness of Mr. Stiles and Dr. John Thomson.

The order the cases are given in is based on the method of treatment each received, this being in successive cases progressively more radical.

Case I.—John M., æt. 5 weeks. Admitted 7th July 1906. Complaint—Constipation and swelling of abdomen since birth; vomiting for two days.

History.—Child appeared healthy at birth. Bowels did not act during the first three days of life in spite of castor-oil. On third day a motion after an injection. During the first three weeks bowels never moved naturally, and injections had to be given regularly. For the two weeks before admission the bowels have acted naturally. Motions pale. Has had occasional vomiting ever since birth, but during the past two days it has been persistent, and vomit has been green in colour. The swelling of the abdomen was noticed shortly after birth, and this has persisted, and for the past two days has been much more marked than formerly. Takes nourishment well, but is getting very much thinner.

State on Admission.—Weight, 7 lbs. 10 ozs. Small pinched face. Nutrition poor. Abdomen is much distended; the skin tense and glazed, and superficial veins unduly prominent.

Circumference at infracostal plane . .	16 inches.
„ „ umbilicus . .	15 „

At intervals intestinal patterns can be very distinctly seen. In the epigastric and hypochondriac regions a large piece of gut stands out prominently in rigid spasm, and can be easily grasped in the fingers. Another large and prominent piece of gut can be seen and felt passing from the left side of the umbilical region downwards to the left iliac region. Other smaller patterns frequently standing out can be both seen and felt. In the right iliac region very marked splashing can be elicited by palpation.

Borborygmi are occasionally heard. Palpation of abdomen between the intestinal spasms reveals nothing. Nothing abnormal in heart and lungs. Examination under chloroform revealed a somewhat narrow rectum, but no definite stricture.

Treatment.—Daily lavage of bowel was followed by great improvement. Ten days after admission child became suddenly collapsed, and, in spite of all treatment, died the following afternoon.

Sectio.—The whole of the large intestine was dilated and hyper-

trophied, the hypertrophy of the muscular coat being the most striking feature.

The condition was not specially localised to any one portion, but affected the whole of the great gut. No stricture of rectum. The small intestine appeared if anything slightly thickened. Pylorus and bladder showed nothing abnormal. Liver showed cloudy and fatty changes. Lungs showed some acute broncho-pneumonia.

Case II.—Lizzie N., æt. 2 years and 4 months. Admitted 3rd November 1900. Complaint—Chronic constipation and swelling of the abdomen.

History.—Ever since birth child has had a swollen abdomen, and has been very constipated—the bowels acting every four or five days.

At the age of eleven weeks suffered from an attack of complete obstruction of the bowels, which was diagnosed as intussusception, but no blood was passed per rectum, and the condition was relieved by enemata. During the first year and a half of life enemata were given regularly to secure an action of the bowels. At the end of the period child had a very severe attack of diarrhœa, lasting for one week. The motions were very frequent, and on several occasions contained blood.

Motions were at all times very offensive, and the child daily passed much flatus of very offensive odour.

Fourteen days before admission, after a few days of very troublesome flatulent distension, child had another attack of diarrhœa. There was again blood in the stools. Child has always had a very large appetite, and has otherwise been healthy.

State on Admission.—The abdomen is enormously distended, and the superficial abdominal veins are dilated and prominent.

No patterning can be made out. Tympanitic note on percussion all over. No resistance or mass palpable. Rectal examination entirely negative. Abdomen was examined under chloroform anæsthesia, but with negative result.

A long rubber tube was passed up the bowel for twelve inches, and the colon irrigated. Two copious evacuations resulted.

On 6th November the abdomen was explored through a median incision below the umbilicus. The entire length of the intestine was examined. The small intestine was normal. The large intestine was dilated throughout its whole extent, but especially the pelvic colon and upper part of rectum, where there was also some hypertrophy of the bowel wall. No obstruction was found. Abdomen closed. On the night after the operation child commenced to vomit. This continued throughout the following days, and she died two days after the operation.

Sectio.—No peritonitis.

The colon was found dilated throughout its whole extent, but

especially in the sigmoid flexure, and full of fæces. Very little hypertrophy of its wall. No definite organic obstruction anywhere, although the rectum in its lower part appeared relatively narrow.

Case III.—Herbert B., æt. 5½ years. Admitted to hospital on 23rd June 1902. Complaint—Constipation since birth.

Swelling of abdomen since a few weeks after birth. Both these conditions have become more pronounced in the past few weeks.

History.—Child was thin and badly nourished at birth. In spite of castor-oil and enemata, bowels did not act for almost a week after birth. The child was born on a Tuesday, and bowels did not move until the following Monday.

During infancy the child constantly required opening medicine and injections, especially during teething. When a few weeks old, mother noticed that abdomen was unduly large, and that it became at times very distended. Diarrhœa on one occasion (when one and a half years old) in summer, when it was prevalent in the neighbourhood. From infancy has required enemata at least once a week.

The child has frequently had acute attacks of abdominal distension, with constipation, lasting for about a week, and coming on and passing off gradually. The doctor who attended the child prescribed castor-oil every morning, and, in addition, the iodide of iron and cod-liver oil, and an open-air life, as the diagnosis at this time was tuberculous peritonitis.

The swelling of the abdomen, however, remained, and except during a few weeks at the end of 1901, the child was as constipated as ever. In March 1902 the child had an unusually severe attack of constipation and distension, the legs being swollen on this occasion. This subsided, however, under treatment with castor-oil and enemata.

In the end of April 1902 a similar attack of distension, which on this occasion did not yield so completely to treatment. The swelling diminished only slightly under treatment with enemata, and two weeks before admission, after a chill from sitting with wet feet, the distension again became much more marked. In spite of injections the abdomen increased in size every day; the child refused food and lost flesh rapidly. On the day before admission, passed a great quantity of flatus and got much relief, but this was only temporary, the distension increasing rapidly.

State on Admission.—An anæmic, thin and feeble child. Pulse rapid, small and weak. The abdomen is enormously distended and dilated; superficial veins can be seen coursing over it. The distension appears greatest in the upper part of the abdomen, and the lower part of the thorax is broadened out. No peristaltic waves can be seen. The skin of the abdominal wall is tightly stretched and shiny. On palpation no special resistance can be felt. On percussion, general tympanic note. No dulness in flanks. No thrill.

Per Rectum.—No spasm of sphincter. Rectum capacious, full of semi-fluid dark greenish fæces. Nothing abnormal felt.

On 24th June 1902 an exploratory laparotomy was performed. On opening the abdomen what looked like an enormous cyst presented. This was found to be a greatly distended pelvic colon with markedly thickened walls. The descending colon and, to a less extent, the transverse colon were also distended.

The pelvic colon was brought into the abdominal wound; with fine loop sutures of silk, the wall of the bowel was sutured to the muscles of the abdominal wall. A continuous silk suture was now put in, uniting the bowel wall to the skin.

Four days later the bowel was opened and the mucous edges stitched to the skin. On opening the gut an enormous quantity of flatus escaped, followed by a considerable quantity of fluid fæces, the abdomen flattening out considerably. For some days after this the child was very weak, and lay in a curious listless and apparently toxæmic condition. After this, however, he got rapidly stronger, and went home thirteen days after the operation, taking full diet. Child remained in good health, bowels action regularly through the colostomy opening. In February 1903 child readmitted, as parents very anxious that the colostomy opening should, if possible, be closed. Exploratory incision made in mid-line. The parts were fully examined. No stricture or organic construction of any sort to be made out, but only an enormously distended and hypertrophied colon. Abdomen closed without anything further being done, as it was thought wiser to leave the colostomy opening.

Seen in June 1906 and again in July 1907 patient was in the best of health. One motion daily, after breakfast, through colostomy opening. Attending school. Always a good appetite for food. Abdomen still abnormally large. (Fig. 2.)

Case IV.—William M., æt. 6 years. Admitted to hospital on 24th March 1906. Complaint—Constipation from birth. Swelling of the abdomen for the past twelve months.

History.—Ever since birth child has suffered from most obstinate constipation. No special prominence of the abdomen was noticed till one year before admission. At this time the abdomen began to gradually enlarge and the constipation became more pronounced than ever. Motions were small, hard, and passed with a good deal of straining. During the year before admission the abdomen has steadily increased in size, and the child has lost flesh and become dull and apathetic. There has been no pain in abdomen at any time.

State on Admission.—Patient is a small, pale and delicate-looking child. Nutrition very poor. Tongue dry and furred. Thorax is narrow above, but greatly expanded in its lower part. There is great enlargement of the abdomen, especially in its upper part.

Circumference at infracostal plane . . 23 inches.
„ „ umbilicus . . 22 „

Every now and then in either flank and across the upper part of the abdomen a swelling two to three inches broad stands out for a few moments and then fades away. This swelling, when present, feels hard, otherwise there is no resistance or mass palpable in abdomen. Percussion reveals an enormously distended colon, filling the abdomen except for a small area round the umbilicus. The liver is pushed upwards, well under the costal margin.

For six weeks the child had treatment with frequently repeated enemata and doses of purgative medicine, with no improvement as regards the abdominal distension.

On 24th April 1906

Circumference at infracostal plane . . $24\frac{3}{4}$ inches.
„ „ umbilicus . . . $23\frac{1}{2}$ „

Surgical interference was decided on, and on 10th May 1906 the abdomen was opened in the mid-line below the umbilicus. A greatly distended pelvic colon, very thick walled and fully five inches in diameter appeared, and was with difficulty delivered through the wound. The large intestine was examined throughout its whole extent. The cæcum was of practically normal calibre, and its wall was not thickened. Ascending and transverse colons normal, but descending colon greatly distended and pelvic colon more so, especially in its lower part. A lateral anastomosis was now performed between the ileum (eight to ten inches above ileo-cæcal valve) and the dilated pelvic colon. The pelvic colon was first punctured and a great quantity of gas allowed to escape. The site of puncture was made the centre of the anastomosis.

An iso-peristaltic anastomosis $2\frac{1}{2}$ inches long was made. It was definitely ascertained that there was no organic obstruction below the dilated colon.

For the first week after the operation there was troublesome vomiting; after that convalescence was uninterrupted, and the child was discharged six weeks after the operation. Bowels moved naturally once in four to five days, the motions being pale and semi-solid. An occasional enema still required. Remained in good health till 2nd August 1906, when he was readmitted with symptoms of obstruction, vomiting and distended abdomen.

On admission

Circumference at infracostal plane . . 27 inches.
„ „ umbilicus . . . $26\frac{1}{4}$ „

Numerous large enemas were given, and the symptoms subsided and child was discharged in four weeks.

Seen again in September 1907. For the past year has been in good health. Bowels have acted regularly, and there has been no tendency to obstructive attacks or distension.

PLATE I.

FIG. 1.

CASE III. Before the bowel was opened.

FIG. 2.

CASE III. Five years after operation.

Case V.—James D., æt. 60 years. Admitted to hospital on 2nd May 1906. Complaint—Great pain, distension of abdomen and constipation.

History.—Except for occasional constipation patient was fairly healthy up till the age of 44. Then he began to suffer from pronounced constipation, which has steadily got worse during successive years. Along with the constipation came also distension of the abdomen, which has varied much in degree from time to time, but has always shown a tendency to become more and more marked. At first, ordinary aperient medicines gave relief, but latterly he has frequently required enemas to produce a motion.

Ten years ago he had an attack of acute abdominal distension, with severe colicky pains and obstinate constipation. This attack lasted for three days, but was ultimately relieved by repeated enemata.

During the past four years the distension and constipation have been much more pronounced, and he has frequently noticed the bowel standing out in spasm, and has been much troubled with rumbling noises in the abdomen. Sometimes the sudden passage of a very large quantity of flatus relieved the abdominal distension.

One month ago he had another attack of complete stoppage of the bowels, with great abdominal distension. He was admitted to Chalmers's Hospital and treated with enemata. At first he was given an enema of over six pints of soap and water. This was retained for several hours, and only after giving another enema of several pints was the fluid returned with a great quantity of flatus and his symptoms relieved. He was discharged in a week "relieved." For the past week there has been no proper action of the bowels, but he has passed quantities of flatus and mucus occasionally. The abdomen has become greatly distended and now interferes with breathing. He has also had frequently recurring spasms of abdominal pain, during which the bowel stands out prominently.

State on Admission.—Patient is a somewhat thin but fairly healthy-looking man. Every few minutes he gets an acute spasm of abdominal pain which lasts for about two minutes at a time. The abdomen is very markedly distended, resembling a full time pregnancy; the skin is tense and shiny, and the superficial veins are prominent. Tympanitic note all over abdomen, except in hypogastrium (distended bladder). Rectal examination reveals nothing abnormal except a somewhat enlarged prostate. Bladder emptied by catheter. Enema given, returned without flatus.

Operation, 2nd May.—An incision 3½ inches long made half an inch outside the outer border of right rectus muscle. When the peritoneum was opened, very much distended large intestine presented. With a continuous silk suture a portion of this distended bowel was sutured into the wound, the stitches taking up the peritoneum and the internal,

oblique and transversalis muscles. A trocar and cannula was now plunged into the exposed portion of bowel, and a great quantity of gas and fluid fæcal matter allowed to escape. With a knife the opening made by cannula was now enlarged and a rubber tube was inserted and stitched to the bowel by two silkworm gut sutures. Skin incision now closed with silkworm gut, one stitch fixing the rubber tube.

After the operation great quantities of flatus and fluid fæces passed through the tube into a bucket by the side of the bed, and the abdomen became much reduced in size. He continued to improve for two weeks, when it was thought advisable to explore in the mid-line to ascertain the cause of the obstruction.

2nd Operation, *15th May* 1906.—Incision eight inches long in mid-line below the umbilicus. On opening the peritoneal cavity a very much dilated and hypertrophied pelvic colon was found, and it was seen that it was this portion of bowel which had been opened at the first operation. The bowel was very thick walled, resembling a great hypertrophied stomach; it showed a slight degree of volvulus. This was untwisted. No organic obstruction of any kind could be found to account for the obstructive symptoms. It was thought wiser to leave the colotomy opening, so the abdomen was closed.

During the next three weeks the patient's general condition improved considerably. The lower bowel was thoroughly cleaned out by enemata, and on 15th June patient was discharged, the bowels acting partly per rectum but chiefly through the colotomy opening in the right iliac region. After returning home the colotomy opening gradually closed, and by the end of July 1906 was completely healed over.

For the next five months patient remained in tolerably good health, except that occasionally he was troubled by flatulence and rumbling noises in the abdomen. The bowels acted regularly as a rule, but he had several slight attacks of diarrhœa.

On 3rd January 1907 he again noticed that his abdomen was becoming distended, and obstinate constipation set in. On 4th January he again began to suffer from cramping pains in the abdomen, he passed no flatus and became more distended. On 5th January he was given a large enema, but it was returned without flatus. The spasmodic pains now became much more frequent and more intense, and the distension was so great as to interfere with his breathing. Repeated enemata were given, but without result, and on 6th January patient was again admitted to Chalmers's Hospital in a condition of great distress.

State on Admission.—Patient has good colour, lies flat in bed, breathing somewhat rapidly.

Abdomen.—There is great abdominal distension, the percussion-note is tympanitic all over. Every few minutes patient has a spasm of pain, when patterning of the abdomen becomes very well marked. A large

coil about four to five inches in breadth rising in the left iliac fossa crosses obliquely upwards and to the right just below the umbilicus into the right hypochondriac region, it then turns across the epigastric region into the left hypochondrium, then down into the left lumbar region, where it became lost. These spasms last from twenty to thirty seconds, and then the abdomen becomes even and globular again. The liver is considerably displaced upwards. The heart dulness is also abnormally high. Immediate operation was decided on.

Operation, 6th January 1907.—An incision five inches long was made through the left rectus muscle below the level of umbilicus. When the peritoneal cavity was opened some clear brownish fluid escaped, and distended colon bulged into the wound. The proximal (smaller) part of the loop of pelvic colon was the first to come out through the wound. It was about three inches in diameter. The wound was now slightly enlarged and a hand introduced into the abdomen. The larger or distal end of the loop was found to be adherent at one point to the old colotomy cicatrix. By putting slight traction on the loop just above this point, the whole of the distended coil proximal to this point was delivered through the wound. The distal end of the loop was enormously hypertrophied and distended, resembling in size a man's thigh, and being quite five to six inches in diameter.

The abdominal cavity having been shut off with sterile swabs, the bowel was punctured with a trocar and cannula. A great quantity of flatus and some liquid fæcal matter escaped, and the loop completely collapsed. It was decided to resect this loop of bowel and do an end-to-end anastomosis. This was accordingly done. The difficulty occasioned by the disparity in size of the two ends of the loop was got over by partially closing the large distal end till it just fitted the small proximal end, just as was formerly done in a Billroth's gastrectomy. The abdomen was closed in layers by three rows of sutures. The patient stood the operation well, his pulse at the conclusion being 74, strong and regular.

For the first two weeks after the operation patient did very well. The stitches were removed on the tenth day, and the wound had healed by first intention. On the twelfth day after the operation, however, he developed cystitis (he had suffered from this on two previous occasions), and had much straining with micturition. On the fourteenth day after the operation, after straining to pass water, the abdominal wound was found to have completely opened up and had to be stitched under an anæsthetic. Convalescence was somewhat protracted owing to the cystitis.

Patient also suffered during the first four or five weeks after the operation from spasmodic griping pains in the portion of the large pelvic colon which had been left behind, and during a spasm this could be seen standing out in the hypogastric region. The frequent passage

of a stomach tube per rectum brought away large quantities of flatus and gave most relief. Numerous drugs were tried for the chronic flatulence and spasmodic pain. Opium and calomel given together, and later β-naphthol, were found to give most relief.

After a somewhat trying and tardy convalescence patient went home ten weeks after the operation. The bowels were now acting regularly, and all obstructive symptoms had disappeared. Before sending patient home an examination of the lower portion of the colon was made with Mummery's sigmoidoscope. It was easily introduced 28 cm. It was ascertained that no ulceration was present. After discharge patient remained well for two weeks, the bowels acting regularly. Then constipation again set in, with swelling of the abdomen, and the old griping pains. Repeated enemata were of no avail, and on 3rd April 1907 patient was again admitted to hospital.

State on Admission.—Patient looks ill, and skin has a yellowish tinge. There is marked distension of the abdomen in its lower half, the dilated colon standing out clearly. Every now and then a spasm comes on, and the patterning of the abdomen is then more distinct.

Per Rectum.—Through the anterior wall of the rectum a tense rounded swelling can be felt completely filling up the pelvis. A long tube was passed per rectum, but no flatus came away. A turpentine enema gave no relief. At 2 P.M. on the 4th April a hydrocele trocar and cannula was plunged through the abdominal wall, at the site of the old colotomy wound, into the distended colon. Gas immediately escaped and gave patient relief. The cannula was left *in situ*, being fixed with strapping. On 5th April the spasms had returned and patient showed signs of peritonitis, therefore operation agreed on.

Operation, 5th April.—Incision made through the old colotomy cicatrix in the right iliac region. When the peritoneum was opened some brownish serous fluid escaped. It was found that the old adhesions in this region had been stretched, and the colon was not in close apposition with the abdominal cicatrix. The cannula had thus slipped out of the colon and caused slight peritonitis. A drainage tube was introduced down into the pelvis, and the wound partially closed. A second incision two inches long was now made in the mid-line directly over the colon and through the old median cicatrix. With a curved needle and strong silk a portion of the distended colon was sutured to the edges of this wound, thus isolating a portion of the bowel for puncture. A trocar and cannula was now plunged into the bowel, and a large quantity of flatus escaped. Cannula now withdrawn and a small rubber tube inserted through the small opening in the bowel and fixed with a stitch. This gave relief for a few days, then the opening into the bowel was enlarged, and mucous membrane stitched to the skin edges of the wound so as to give patient a permanent colostomy opening.

Patient returned in October 1907 to report. Says he is in better health than he has been in for years; bowels act regularly per anum. No fæcal matter comes through the colostomy opening, which simply acts as a safety-valve, allowing flatus to escape occasionally. The colostomy opening causes him very little inconvenience, and he is eminently satisfied with his condition.

Pathological Report on Resected Portion of Bowel.—The bowel is very much dilated, and shows great hypertrophy of its walls. There is no ulceration.

Microscopically.—The increase in thickness is found to be due almost entirely to an enormous hypertrophy of the circular muscular coat. This is about four times its normal thickness, and has the appearance of a pure hypertrophy, the muscular fibres being larger and more numerous than normal. There is a slight increase in the interstitial fibrous tissue between the muscular bundles, but this is not a striking feature. The longitudinal muscular coat is slightly thicker than normal. The mucous and submucous coats show some slight increase in fibrous tissue, but are otherwise normal.

The question now at once arises as to whether this was really a case of Hirschsprung's disease, or whether the condition, appearing as it did in a man over forty years of age, was not simply the result of chronic constipation and slight recurring volvulus.

Personally, I think it must be regarded as a true case of Hirschsprung's disease which had been completely compensated in early childhood, but in which, with advancing years, compensation gradually became inadequate, and led to distension with secondary kinking and slight volvulus, with the resultant obstructive symptoms. The volvulus, which was slight, was, I feel sure, a secondary development dependent on the great distension of the pelvic colon.

In this case, also, there was a certain amount of kinking of the lower part of the pelvic colon over the upper end of the rectum, as was shown by the return of the obstructive symptoms after the proximal part of the pelvic colon had been resected.

The case is instructive from the point of view of treatment, as showing the value of a small colostomy opening, as a safety-valve, in cases where the affected portion of bowel cannot be completely resected.

Treatment.—It is generally recognised that to cure this disease is in the great majority of cases impossible. Our aim, therefore, must be to decide which are the most successful methods of palliative treatment.

Most observers are agreed that medical treatment alone is insufficient, and some form of surgical interference is called

for. However, though no case of actual cure of the condition by medical treatment has been recorded, several cases have shown very marked improvement under suitable medical measures. It is therefore only right that in the first instance medical means be given a fair trial, and only when these fail to effect improvement should an operation be undertaken. Moreover, as the disease becomes more widely known, it will be much more frequently recognised in its early stage when treatment of a purely medical nature is of undoubted value. On the other hand, the only completely successful results so far recorded have been obtained by surgical treatment. Medical treatment must always have two main objectives—firstly, to improve the muscular tone of the colon, and, secondly, to prevent stagnation and fermentation in the colon.

The question of the most suitable diet for such cases is not yet decided. Most writers recommend a diet which will leave as little residue as possible. It is, however, not unlikely that the giant colon could contract upon and propel onwards a bulky residue better than it could a small one.

In infants on the breast, weaning should be delayed as long as possible, as a change to artificial feeding almost invariably aggravates the condition.

Ordinary purgative medicines are of little value, but drugs which increase the muscular tone of the bowel, *e.g.* strychnine and belladonna, have been found to be useful. Cheadle has laid special emphasis on the value of drugs increasing intestinal tonus in cases of pronounced constipation in children, and many of the cases reported by him were probably examples of the milder degrees of Hirschsprung's disease.

Intestinal antiseptics or antifermentative drugs, such as β-napthol or sodium sulpho-carbolate, may be used with benefit.

Unquestionably the medical measure of most value is lavage of the colon. This should be carried out at least once daily, a long rubber tube being passed per rectum right up into the dilated colon, and the latter irrigated with several pints of water. By this means fermentation and distension are to a great extent obviated.

Abdominal massage is of undoubted value, not only because it stimulates muscular contraction of the colon, but also because it enhances the strength and tone of the abdominal muscles which are over-stretched and weak. Escherich lays particular stress on the latter point, and advises also the wearing of an elastic

abdominal binder. Massage is, of course, contra-indicated in all cases where one is led to suspect that ulceration is present. Electrical treatment has been frequently employed, generally along with massage, and apparently with benefit. Lennander, who especially recommended it, inserted one electrode per anum into the dilated colon, and applied the other with a stroking movement to the abdominal wall. Should an acute obstructive attack supervene, one may feel certain that whatever the primary cause of the malady may have been, there is now some kinking of the distended loop over the normal bowel below, and that the repeated efforts of the bowel to overcome the kink are simply tending to aggravate the obstruction. Short of surgical interference, two methods of treatment are open to us in such a contingency. One may pass per rectum a fairly rigid rubber stomach tube, and the instrument rounding the kink allows of the sudden escape of a large quantity of flatus with great relief to the patient. Secondly, one may administer drugs which will lessen the intestinal spasm always present in such attacks. Opium in some form is the drug of most value. Passage of flatus has frequently followed the relaxation caused by an opiate during such attacks.

These two methods may be very profitably combined.

If medical treatment does not succeed in palliating the condition of chronic constipation with distension and toxæmia, if attacks of ileus recur frequently, or if any one of these attacks resists medical treatment, then surgical interference is indicated.

Very many methods of surgical treatment have been practised, and much has been written on the subject. One need therefore only consider here the methods which are most frequently applicable and which have met with most success. These are—resection of the affected portion of colon, entero-anastomosis, coloplication, colopexy, and colostomy.

Resection is unquestionably the operation of choice, and the best results have been obtained in those cases where it has been successfully carried out. This operation is, however, frequently rendered very difficult, if not impossible, by the dilatation involving the lower part of the pelvic colon. In such a case one cannot get below the dilated portion, but must cut through it, and if one divides the bowel above on the proximal side of the dilated part, then there is great disparity in the size of the two cut ends to be united. This difficulty can be got over either by closing both the cut ends and then doing a lateral anastomosis,

or by partially closing the larger lower end till it fits the other one, and then doing an end-to-end anastomosis, just as was done in a Billroth's partial gastrectomy (the latter method was employed in Case V. of my series).

It were probably better, however, to restrict the operation of resection to those cases where the dilated and hypertrophied portion of bowel can be removed in its entirety. A case was recently reported where the whole colon was resected, the ileum being united to the rectum.

Short of Resection, what is the Operation of Choice?—The answer to this question cannot be a dogmatic one, but is dependent in each individual case on the pathological anatomy of the colon.

Colopexy.—If the dilatation and hypertrophy have not reached an advanced stage, and especially if from the symptoms before operation and from the condition of parts found at operation one recognises that kinking in the lower part of the pelvic colon has been a potent factor in causing the condition, then colopexy might with advantage be performed.

The lower part of the pelvic colon is pulled up and then fixed to the abdominal wall. The fixation of the colon must be very thoroughly carried out, otherwise the powerful hypertrophied bowel, by its forcible peristalsis, tends to break loose again. Kredel recommends anchoring, by stitches, the pelvic meso-colon as well as the pelvic colon.

This operation is obviously only of value in a small proportion of cases.

Coloplication is indicated if the dilatation of the colon be found to be much in excess of the hypertrophy. This operation was eminently successful in a case of this type reported by Brooks. Longitudinal tucks are made in the colon till it is reduced to normal or nearly normal size. Cases suited for this operation are undoubtedly rare.

Entero-anastomosis is indicated if the enlargement of the colon be not extreme and there be no history of recurring attacks of ileus. Under the heading entero-anastomosis one refers particularly to the operation where the lower part of the ileum is anastomosed laterally with the pelvic colon.

Lateral anastomosis of the two limbs of a dilated loop of pelvic colon, and also of the pelvic colon with the rectum, have been practised, and a history of ileus would of course be an indication for one or other of these operations, but the first of them has not given good results, and the second, though sound in theory, is

extremely difficult in execution, so that one need not consider them further.

The principle of the "ileo-colic" anastomosis is that the influx to the pelvic colon of the liquid contents of the small intestine prevents the stagnation and gaseous distension, which are the chief factors in producing the troublesome symptoms of this disease. The only points about the operation requiring mention are, that the anastomosis be made large enough (at least two inches long), and that it be iso-peristaltic.

In one case of this kind, however, a successful result was only obtained after a second operation, at which the ileum was divided distal to the anastomosis and the two cut ends closed.

Entero-anastomosis was successful in relieving Case III. of my series of all the symptoms.

Colostomy is indicated in many cases as a temporary measure when operation is performed for acute obstructive symptoms, and the patient's general condition will not permit of any more serious interference.

Some writers, particularly Kredel, regard colostomy in this disease simply as an emergency operation, and "would never recommend it in an uncomplicated case or as a permanent method of treatment."

One must, however, take exception to this statement, as there is one type of case in which colostomy appears to be the only reasonable operation. This type is something as follows:—The case is a long-standing one, with great abdominal enlargement and suffering from recurrent obstructive attacks. On opening the abdomen an enormous pelvic colon is found, with thick leathery hypertrophied walls. The dilatation involves the lower part of the pelvic colon, so that one cannot get below it to resect, and its relation to the rectum is such that kinking in this region is liable to occur.

Nothing else than a small colostomy opening will ensure, for such a case, relief.

The colostomy opening, though securely made, need only be very small, as its function is merely that of a safety-valve and not that of an artificial anus; that is to say, that while it will relieve all flatulent distension by allowing gas to escape, the bowels will act by the normal channel.

Case V. of my series illustrates how successful this method of treatment may be. The disagreeable state of having a permanent abdominal opening is more than compensated for in these cases

by the freedom from chronic toxæmia and from obstructive attacks which they enjoy.

Etiology.—The greatest interest unquestionably centres round the question as to what is the primary cause of the condition. Here we are at once beset with the difficulty that we do not at present know the pathology of the early stages of the malady, for by the time that cases come under medical supervision it is more than probable that secondary developments have obscured the primary cause.

To fully understand the views brought forward in regard to the etiology, one must bear in mind that in the new-born infant the pelvic colon and its mesentery are relatively long and lax. Thus, whereas in the adult the pelvic colon bears to the rest of the colon, as regards length, the relation of 1 to 3·5, in the new-born child the similar relation is 1 to 1·7, and during the first two years of life the relation averages roughly 1 to 2. Moreover, in the infant the pelvic meso-colon has a comparatively long and extensive attachment to the posterior abdominal wall. These factors combine to give this portion of the colon a very wide range of mobility, and consequently one may find it occupying almost any region of the abdomen.

The question as to whether some cases are of nervous origin must remain for the time being *sub judice*, as no definite evidence for or against this view is available.

Everyone is agreed that the cause of the condition must be a congenital one, but no definite evidence has been brought forward to show that there is an abnormally large colon with thick hypertrophied walls in any of these cases *at birth*, as Hirschsprung and Kredel believe. The only case where the signs and symptoms of this disease were present from birth is recorded by Escherich. The case was that of a child in whom at birth the abdomen was noticed to be distended, and where vomiting of meconium shortly followed. The child lived to the age of three and a half months, and during this time had a swollen abdomen, pronounced constipation, and vomiting. At the post-mortem the pelvic colon was very large, long and distended, the transverse colon was distended. Microscopic examination revealed no trace of hypertrophy in the bowel wall. Escherich was of the opinion that the cause of the trouble here was an abnormally long and large great gut, and that if the case had lived it would have developed into a typical case of Hirschsprung's disease. In no case where a child has died during the first few days of life has the typical hypertrophy of

PLATE II.

FIG. 3. (After Perthes.)

Mechanism of kinking of pelvic colon over rectum with valve formation.

FIG. 4.

Abdomen of new-born child. Small intestines removed; water injected into the lower cut end of ileum; distension of colon most marked in its pelvic portion which fills the lower half of the abdomen.

the bowel wall been demonstrated. (The case recently reported by Schmidt as one of truly congenital dilatation and hypertrophy is unconvincing.)

The anatomical theory held by many is, briefly, "that an exaggeration of the long sling-like pelvic colon, found normally in the infants, is the cause of the disease."

Some hold that simply the increased difficulty in the onward passage of the bowel contents, caused by the abnormal length and numerous bends in the pelvic colon, is sufficient to cause the condition; others think that the abnormal length and multiple bends predispose to kinking and valve-like action, and dilatation and hypertrophy occur above such kinks. There can be no doubt that in the very long and much convoluted pelvic colon found in some infants any degree of distension would be very liable to cause a certain degree of kinking; should this once happen, one can readily understand what the sequence of events would be. The stagnation and gas formation above the kink would only tend to accentuate the latter, and even should the kink for the time being be overcome, it would just as readily again occur, and the recurrence of attacks of obstruction would gradually lead to dilatation and hypertrophy of the bowel above. The attacks of complete obstruction, from which many cases of this disease periodically suffer, lends support to the belief that kinking plays a considerable part in their etiology. It has frequently been urged against this theory that, were obstruction from kinking the cause, not only would the pelvic colon be dilated, as it so frequently is in this disease, but the rest of the large intestine would be always found dilated as well. This argument, however, is not based on fact, as it has now been repeatedly proved that the pelvic colon is the most readily dilatable part of the large intestine. This can be demonstrated experimentally by cutting across the ileum and injecting air or fluid into the lower cut end. It is found that the pelvic colon dilates to a much greater extent than any other part of the large intestine. (See photograph.)

Moreover, apart from cases of this disease altogether, one occasionally finds (in children at least) the pelvic colon greatly distended with gas, while the rest of the colon shows little or no dilatation.

Further, Zillner has drawn attention to the fact that the pelvic colon is the seat of election for rupture of the large intestine in new-born children.

Lastly, Sudsuki, investigating the subject of intestinal diverti-

cula, found that true diverticula occur more frequently in the pelvic colon than in any other part of the intestinal canal. That actual kinking does sometimes occur when the disease is established has now been definitely proved on several occasions, more especially by Ibrahim and by Neter.

The situation of the kink or valve may differ in different cases, but many believe that it is the pelvic colon which kinks over the upper end of the rectum, valving the latter. In such a case the distension of the pelvic colon above the valve simply compresses the rectum more firmly and aggravates the obstruction, but frequently as the distended pelvic colon rises in the abdomen (which it always does when greatly distended), its lower end is drawn up out of the true pelvis and the valve is opened with at least temporary relief. Further, in support of this theory is the fact that experience has shown that in some cases of this disease, if a small colostomy opening be made in the dilated bowel, which simply allows gas to escape, not only will the troublesome obstructive symptoms disappear, but the bowels will act regularly. Perthes demonstrated, in a case in which he had performed colostomy for this condition, that though rectal injections readily escaped from the preternatural anus, injections through the fistula did not come away per anum—showing the presence of valvular obstruction. The mere fact that long sling-like pelvic colons are frequently seen in the post-mortem room in cases which have had no symptoms of this disease is, in my opinion, no evidence against this theory, as the second factor of kinking is always necessary in this class of case.

On the other hand, although we allow that the anatomical structure of the pelvic colon in new-born infants and young children does predispose it to kinking with obstruction, and though we may grant that this anatomical factor does play a considerable part in the causation of many cases, we must at once recognise that in a considerable proportion this "kinking theory" of causation is definitely excluded. I refer particularly to those cases where a dilated and hypertrophied pelvic colon gradually narrows in funnel-shaped fashion into a more or less normal rectum, and where a kink or valve was obviously not the causal factor. (Hawkins lays particular stress on the frequency of this class of case.) I believe that a physiological factor carried to excess plays a large part in the etiology of such cases, if not of all cases.

This factor I believe to be primary over-distension of the

PLATE III.

FIG. 5.

Pelvic colon of a new-born infant showing great distension with meconium.

FIG. 6.

Dilated pelvic colon in a child who died twelve hours after birth. The distended loop contained gas and meconium, fermentation of the bowel content having already commenced.

pelvic colon with meconium. My grounds for this belief are as follows: —In examining the abdomens of newly-born infants one is struck by the fact that while the small intestine is usually more or less collapsed and empty, the large intestine, but more especially the pelvic colon, is almost invariably full of and is frequently distended with meconium. In some cases this was so pronounced that the pelvic colon resembled very much in its proportions that seen in Hirschsprung's disease, and suggested some distal obstruction, but no kinking or rectal atresia was found.

Evidently at or just prior to birth there is a physiological propulsion of the meconium to the lower part of the large bowel, distending it. The degree of this distension varied greatly in different cases, and one could readily imagine that if this physiological distension were carried to excess, the ability of the bowel wall to contract after birth and expel the meconium would be seriously impaired. Moreover, should the tonus of the infant's bowel be below normal, the pelvic colon would be the part where it would most probably dilate, as this part is normally distended before or at birth. Abnormally weak tonus is not, in my opinion, an essential factor, however.

Granted that over-distension has taken place at or before birth, one can readily imagine that this over-distended pelvic colon will not empty itself after birth so soon or so readily as normal, just as we find defective action in an over-distended bladder. Now we know that though meconium is sterile at birth, within twelve to twenty-four hours it contains bacteria which cause fermentation and gas formation. This excessively distended pelvic colon will be unusually susceptible to fermentation, and the resultant gas formation will further distend it.

If we remember that we are dealing with an organ in a state of active development when its final form, size and position have not as yet been attained, and when it is peculiarly susceptible to forces such as pressure and distension, I think we will acknowledge this explanation to be a reasonable one. We may consider, therefore, that we have to deal with a pelvic colon that from the very outset of extra-uterine life must act at a disadvantage, and which never contracts to its normal calibre. This primary over-distension has two consequences which are strictly related to and dependent on each other. The one is hypertrophy of the bowel wall, the other is further dilatation. The hypertrophy of the bowel wall is easily explained. The dilated bowel cannot grip its content and force it on as a normal piece of bowel would, it there-

fore makes constant and only partially successful efforts to do so; this constant action results in hypertrophy of its muscle wall, the "Arbeits Hypertrophie" of German writers. This imperfect propulsion of content, however, leads to a greater or less degree of permanent stagnation in the colon, with gas formation and further distension, so that a vicious circle is kept up and leads to the enormous hypertrophied colons so characteristic of an advanced stage of this disease. The relation which the hypertrophy bears to the dilatation determines the fate of the case. Where the hypertrophy fails to keep pace with the dilatation we get early obstructive symptoms with distension and frequently death from toxæmia in infancy or early childhood. Where the hypertrophy is sufficient to compensate for the dilatation, the child may reach adult life, suffering only from a slightly swollen abdomen and a certain degree of constipation. Adult life being reached, compensation does not usually fail till the degenerative changes of old age begin to set in; then, from fibrous changes occurring in the hypertrophied wall, compensation fails, the bowel dilates further, and leads to the well-known symptoms. In support of this, it is worthy of note that it is extremely rare to meet with a case appearing for treatment between the ages of twenty-two and forty, although numerous cases have been reported where the patient was over fifty years of age.

One might almost compare the condition to that of a heart which in early life had been so acutely dilated that complete restoration to its normal size was impossible, and in which a regurgitant valvular lesion was also left. (The regurgitation is comparable to the gas formation in the colon.) By hypertrophy of its wall the dilatation is compensated. If the hypertrophy be not in proportion to the dilatation, troublesome symptoms or even early death will ensue. Should the hypertrophy, however, exactly compensate for the dilatation, the patient may live for many years without any cardiac symptoms. As old age comes on, however, and fibrous changes occur in the myocardium, compensation may give way and the disease again asserts its presence.

Bibliography.

A complete and up-to-date bibliography of the subject, compiled by Zesas, will be found in the *Centralbl. f. d. Grenzgeb. d. Med. u. Chir.*, 8th and 22nd March 1909.

A CLINICAL INVESTIGATION OF LUMBAR PUNCTURE.

By PETER MARSHALL, M.D.

LUMBAR PUNCTURE is now a well-established aid to the diagnosis of certain diseases, and deserves to rank with paracentesis of other body cavities in the diagnostic armature of the physician. It has not so far, however, acquired the position among the rank and file of practitioners which its importance merits. At first sight spinal puncture is an alarming operation to perform, but the risks are very small when it is carried out with proper attention to detail. Confidence must be gained by practical experience, and it is well to resist the spirit of contempt which is not infrequently shown towards the operation by those who have gained a limited experience in a small series of easy cases.

The technique is of so much importance, and so much clinical information can be learnt at the time of the operation from the behaviour and character of the fluid, that considerable attention will be paid to this aspect of the matter before briefly discussing the process in relation to various pathological conditions.

History.—The honour of being the first to attempt "local medication of the cord" appears to belong to the American physician Leonard Corning, who described a method of producing spinal anæsthesia in a memoir appearing in 1885 in the *New York Medical Journal*. He commenced by employing extra-dural injections, but extended his researches until, in 1894, he was convinced of the value of penetrating within the meningeal coverings of the cord. Corning does not appear to have attracted any disciples in this line of research, and the methodical study of the subject is generally dated back to the time when Quincke first introduced it. A few years later results of experimental work were published by Chipault, Sicard and others, and in 1899 Bier came into the field with the results of operations performed on patients suffering from surgical affections of the lower limbs in whom the spinal cord had been cocainised locally. The same year Tuffier commenced employing lumbar puncture and spinal anæsthesia. Since that time the communications and number of workers on the subject have been rapidly increasing.

General Considerations.—Spinal puncture is made in the interlaminal spaces situated posteriorly between the spinous and articular processes of the vertebræ. These spaces are lozenge shape, and the

greatest vertical diameter of the fourth lumbar space is about 17 mm., and the greatest horizontal diameter about 15 mm. In practice 15 mm. may be regarded as the largest diameter available in any one direction, and generally it will be found to be less than this. In the lumbar region the various structures which have to be traversed are the following:—Skin, superficial fascia, posterior lamella of lumbar fascia, the erector spinæ muscle, the ligamentum subflavum composed of yellow elastic tissue, the peri-dural space separating the walls of the spinal canal and its periosteum from the dura mater and filled by loose fat and areolar tissue and by the intra-spinal plexus of veins, the tough fibrous dura mater, the subdural space, the delicate arachnoidea spinalis, and the subarachnoid space which contains the cerebro-spinal fluid. The ligamenta subflava offer the greatest point of resistance to the needle; after penetrating these it is in the spinal canal and the point is felt to be free. Sometimes the resistance of the dura mater can also be perceived. The interlaminal space between the fourth and fifth lumbar vertebræ is the one commonly chosen for spinal puncture. With the aid of the highest points of the iliac crests for landmarks this space is comparatively easy to define, and it is to be recommended for general use. Theoretically the subarachnoid space may be punctured anywhere between the second lumbar vertebra and the base of the sacrum without fear of damaging the cord, except in the case of young children. It is well to avoid the second interspace, unless in special circumstances, for fear of possible abnormalities in the termination of the cord; but the third interspace is as safe as the fourth, and it may be used where unsatisfactory results are obtained at the fourth interspace, or where successive punctures at short intervals are being made, thus making a fresh site desirable. Paracentesis in the dorsal region has been recorded without any untoward result, and, as long as it is possible to be certain of a distension of the subarachnoid space with fluid, puncture may be made at any level by a careful operator. But the risks are considerable, and the only indication for such a proceeding is in very critical cases, when no fluid can be obtained from the lumbar region. I have found it possible to obtain fluid by puncture of the cervical region post mortem when none was obtainable in the lumbar region. The spaces between the laminæ are greatest in the lumbar region and smallest in the mid-dorsal region, the operation increases in difficulty therefore in the dorsal region, the obliquity of the spinous processes adding to the difficulty. Many prefer the space between the fifth lumbar vertebra

and the first piece of the sacrum as practised and recommended by Chipault of Paris. It is said to be more simple and less dangerous, but I have not found this site offer any advantages. Where it is desired to introduce therapeutic agents into the spinal canal but external to the dura mater, puncture may be made in the triangular deficiency at the apex of the sacrum, on a level with the sacro-coccygeal joint. A needle can be inserted here in the middle line by directing it obliquely from below upwards and from behind forwards for a distance of 2 to 5 cm.

Special Anatomy.—Before proceeding further, certain anatomical features of the vertebral column and spinal cord may be recalled to mind with advantage. The spine is convex anteriorly from the first cervical to the second dorsal and from the twelfth dorsal to the first sacral; concave anteriorly from the second to twelfth dorsal and from the first sacral to the tip of the coccyx. There is also usually a slight lateral curve, convex to the right, in the dorsal region. The spinous processes are easily palpable, except those of the third, fourth and fifth cervical vertebræ. The cervical spines project horizontally backwards, the dorsal are long and oblique, the lumbar are thick and end in a rough vertical border. A line uniting the highest points of the two iliac crests intersects the fourth lumbar spine in the middle line, and a line joining the posterior superior iliac spines intersects the spine of the second sacral vertebra. The vertebral canal is bounded by the body of the vertebræ anteriorly and by the neural arches, made up of pedicles and laminæ posteriorly. The bodies are bound together by the anterior and posterior common ligaments of the spine and by the intervening joints; the neural arches by the ligamenta subflava, each ligament being attached to the inferior margin and anterior surface of the lamina of the vertebra above, and to the superior margin and posterior surface of the lamina of the vertebra below, and by the interspinous ligaments, inter-transverse ligaments, and the articulations between the articular processes. The canal is broad and triangular in the cervical region, small and circular in the dorsal, triangular and intermediate in size in the lumbar, becoming smaller and flattened from before backwards towards the middle of the sacrum. There is a deficiency in the posterior wall at the lower end of the sacrum. The presence of a plexus of veins superficial to the neural arches and deep to the muscles accounts for free venous bleeding which takes place occasionally from the puncture wound.

The spinal cord is 43 to 45 cm. long, and extends from the

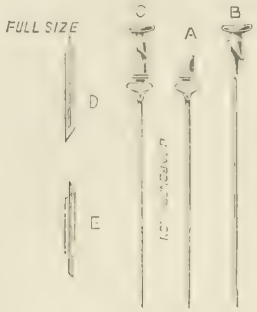
foramen magnum to the lower border of the body of the first or the upper border of the body of the second lumbar vertebra. The exact position of the lower end varies slightly according to the curvature of the vertebral column. At birth the cord reaches to about the third lumbar vertebra, and in a three-month fœtus occupies the whole length of the vertebral canal. The lower end of the cord tapers to a point (conus medullaris), and ends in the filum terminale. The lumbar enlargement begins at the tenth dorsal vertebra, and is largest opposite the twelfth. The cord is enveloped in a sheath of membranes larger and longer than itself. The dura mater and arachnoidea spinalis extend to the level of the second or third section of the sacrum, where they end by blending with the filum terminale. The pia mater is a tough membrane which closely invests the cord, and the blood-vessels of the cord lie between its two layers. Between the arachnoid and the pia mater is the wide subarachnoid space containing the cerebro-spinal fluid. The dura mater forms an even wider and looser covering to the cord and cauda equina in the cervical and lumbar regions than elsewhere. The membrane has also only a flexible attachment to the walls of the spinal canal, from which it is separated by a good deal of loose areolar tissue, fat and venous plexuses. The vessels of the spinal cord are numerous but small, and call for no special mention here. The intra-spinal vessels, on the other hand, are closely concerned in the subject under consideration. A minute artery enters the spinal canal through each intervertebral foramen, and supplies the bones, periosteum, ligaments, spinal cord and membranes. The intra-spinal veins are arranged in an anterior and a posterior plexus. The anterior plexus is composed of two main longitudinal vessels situated one upon each side of the posterior common ligament of the vertebral bodies, and connected with each other by numerous transverse branches. The posterior plexus has similarly two main vessels united by transverse branches placed along the deep aspect of the neural arches and ligamenta subflava. It communicates with the occipital sinus above, and has numerous communications through the ligamenta subflava with the dorsal spinal venous plexus.

Technique.—The instruments required are few and simple, and consist of a suitable needle and sterile tubes to collect the fluid. Various patterns of needles are finding their way on to the market, but the one I have been using with very satisfactory results for some time past, and which was made for me by

Messrs. Gardner & Son, Edinburgh, will be described here. The most essential consideration in any needle for spinal puncture is that the piercing end of the needle should have a short bevelled point. Most of the undesirable results obtained at first were due to using unsuitable needles with long oblique points. To obtain the fluid with these it was often necessary to force them right up against the anterior wall of the canal, even then without success sometimes, owing to the whole of the orifice of the needle not having penetrated within the membranes. Also these long points are very apt to become bent on meeting any resistant body, thus causing unnecessary damage to the tissues and making even the process of extraction a painful one. This detail is becoming generally recognised now since lumbar anæsthesia has come more into vogue, and since Tuffier's and Bier's needles have commanded attention. The diameter of the bore of the needle may be left within limits to individual preference. For infants, where the cerebro-spinal fluid is being drawn off simply to relieve pressure, a fine exploring needle with a short bevelled point and a wire stiletto will be found to answer quite well; but in all cases where there is possibility of a purulent meningitis a comparatively large bore is essential to permit of the passage of the pus through the needle. In cases of epidemic cerebro-spinal meningitis this pus is occasionally very thick and flaky. A precaution upon which I lay particular stress, but which is not very generally practised, is that the needle should be provided with a stylet, preferably closely fitting and bevelled at one end to fit the bevelled end of the needle. The advantages of such a stylet are that it prevents the needle becoming blocked by muscle or other tissue during insertion, or by blood-clot, and it affords facilities for determining that the passage of the needle is free, if for any reason no fluid is obtained or the fluid ceases to flow. Added to this, extraneous cells do not collect in the needle during its passage through the tissues, subsequently to become mingled with the cerebro-spinal fluid. The reality of this accident is proved by the following example:—I performed lumbar puncture in a woman who had been admitted to hospital for typhoid fever: but the case was a very obscure one with a rapidly deepening coma, and the accuracy of the diagnosis was doubtful. In the fluid collected I was puzzled to find numerous globular bodies like fat, which they proved to be on appropriate staining. The patient had a great deal of subcutaneous fat in a semi-fluid condition, and the question presented itself whether the fat was an extraneous

contamination or actually belonged to the cerebro-spinal fluid. Post mortem no unusual cells were found in the fluid, and the globules of fat must have found their way into the needle during transit through the subcutaneous adipose tissue. This was before I had adopted my present form of needle. By protruding the end of the stylet beyond the point of the needle it is possible also to free the orifice of nerve or other tissue which may be lying up against and occluding the opening—an accident which sometimes happens.

The paracentesis needle mentioned above is designed with



PARACENTESIS NEEDLE.

A. Needle (side view).
B. Stylet.
C. Stylet in first position within needle. (In B stylet has been rotated so as to occupy second position.)
Relation of end of stylet to needle is shown at—
D. in first position.
E. in second position. (Arrow shows where fluid escapes.)

special reference to these requirements (see diagram). The needle is 8 cm. long and has a diameter of 1·5 mm., a useful dimension for all ordinary purposes. The point is ground down to a short bevel. The socket at the head of the needle fits the ordinary serum syringes, and has a bevelled upper surface facing in the opposite direction to the bevel of the lower end, so as to permit of the extension of the end of the stylet beyond the point of the needle. The bevel of the stylet is slightly shorter than that of the needle, thus leaving the point and cutting edge of the needle free, and allowing the end of the stylet to be rounded off. The upper end of the stylet is fitted with a hilt which has a flat thumb-rest superiorly, and which is bevelled on its inferior surface to fit the superior bevelled surface of the hilt of the needle. The lower edge of this inferior surface is fitted

with a pin which fits into notches on the surface of the needle hilt so as to prevent inadvertent rotation of the stylet. The shaft of the stylet is ground flat on the longer side to within a distance of the end corresponding to the distance from the upper to the lower level of the bevel on the hilt. By this device the orifice at the end of the needle is completely blocked by the well-fitting lower end of the stylet when the latter is at its first position, but when the stylet is turned through half a circle and driven home, a narrow passage is opened up which allows fluid to escape drop by drop. At the same time nerve filaments or other occluding tissues are held away from the orifice of the needle while the fluid is escaping, and so extra facilities are provided for determining if the dura mater has really been pierced or not, and also the anterior wall of the canal can be gently palpated with the blunt protruded end of the stylet without fear of serious damage. Another advantage is that the fluid is prevented escaping too fast—a matter of importance, as will be shown later—while the stylet can be withdrawn altogether for a second to enable one to estimate any increase of pressure of the cerebro-spinal fluid which there may be. Should no fluid escape the stylet should be withdrawn after protruding it to its full extent, and in cases where there is thick pus in the lower part of the subarachnoid space, a perceptible amount of this can be drawn out on the shelf at the foot of the flattened side of the stylet. The needle will then be left free for the application of a syringe. Another minor advantage is that when the stylet is protruding beyond the end of the needle in the second position, it forms a protection and support to the point—a convenience to take advantage of when sterilising the instrument. Both the needle and stylet are made of steel, a material which I find answers quite satisfactorily, and which is much less costly than the platinum with iridium point usually advocated. Of course these more valuable metals wear longer and give a finer finish to the instrument, and are advised where cost is a minor consideration. I have given trial to fine trocars and cannulæ, but they require more skill in use, and there is greater risk of doing unnecessary damage with them. When used, the point of the trocar must be a short one.

The preparation required for performing spinal puncture is simple. Ordinary aseptic precautions must be taken, and can be allowed to vary according to individual preference and custom. The needle and stylet must, of course, be boiled. Sterile tubes to collect the fluid are necessary if any bacteriological examination

is contemplated. The skin of the patient may be prepared by ordinary cleansing with soap and water, followed by alcohol or ether, or, even better, by corrosive sublimate alcohol. The operator's hands should be scrupulously clean. The neighbourhood of the area for operation is shielded by sterile towels with advantage.

As regards the actual performance of the operation the greatest secret to a quick and happy result is the position of the patient. The lumbar spine must be bent forward to the greatest possible extent so as to open up the interlaminal spaces to their widest limit. This may be done by the patient sitting on the end of a bed or table and bending well forward; or by the patient lying on one or other side in a sitting attitude, with the thighs well flexed on the abdomen and the knees drawn up towards the chin, and with the shoulders stooping to meet them. The surface on which the patient is sitting or lying should be as flat and rigid as possible to prevent the vertebral column being thrown into curves and bends which may distort or obliterate the desired space and lead to considerable difficulty. The buttocks should be pulled conveniently over the side of the bed to permit of easily collecting the fluid dropping from the needle. With young children and delirious adults the greatest difficulty is often found in holding them still in this position, and the skill of assistants, acquired by experience, will often save an unseemly struggle or the necessity of administering a general anæsthetic. Only those who have tried have any conception of the difficulty of holding still, in a fixed position, a helpless-looking child with its marvellous and inexhaustible power of wriggling, or a powerful man who is robbed of his mental control. Personally I think it preferable to give a general anæsthetic in all such cases, any disadvantages attaching to the anæsthetic being of less importance than those attendant on violent and prolonged struggling. A custom in some quarters is to bend children over a pile of pillows. I have tried the position, but did not form a favourable opinion of it. The sitting position is used chiefly preparatory to spinal anæsthesia, and the interlaminal space to left or right of the spine may be chosen; but with the patient on his side the spaces corresponding to the side on which he is lying, as being on the lower level, are recommended.

The patient now being in a good position the next thing is to define the spinal processes and the level at which puncture is to be made. In infants, thin children and adults, no difficulty

is experienced in this, but with muscular or fat people the difficulty may be very great. Where a thick layer of subcutaneous fat is the cause of the difficulty, firm pressure maintained by the thumb for a minute or two will often displace locally some of the soft fat and enable the bony landmarks to be defined. It has been mentioned already that a line joining the highest points of the iliac crests crosses the 4th lumbar spine in the middle line. The spinal eminences above and below this level are defined, or, if there is uncertainty as to what is felt, it is a help to trace down the spines from a higher level by touch. The inter-spinous spaces are then located by the left thumb or fore-finger, and, the site of election having been determined, the locating digit is used as a guide to the point of the needle. The needle (if the special one described is being used) is held between the first and second fingers of the right hand with the thumb resting on the disc of the stylet to steady the instrument and to push it home to its destination. The point of the needle is placed against the skin over the space which has just been defined at about ½ to 1 cm. to the side of the mid-spinal line in adults, while in young children actually the middle line will be found to answer well, and the patient, if old enough and conscious, is warned that his back is going to be pricked and admonished to try and keep quite still. The point is made to penetrate the skin with a rapid movement and the needle is then steadily pushed in a forward direction and with a very slight upward and inward inclination through the interlaminal space. The needle will require to be introduced for about 5 or 6 cm. in the adult and about 3 cm. in the young child. On entering the space the point of the needle will be felt to be free and the stylet should be revolved to its second position, when, if the membranes have been pierced, fluid should commence to drop out. If no fluid is obtained, withdraw the stylet a little and rotate the needle. This simple manœuvre is often sufficient to determine a perforation of the dura mater, which before was only indented by the needle point. The stylet is then replaced in its second position and the fluid allowed to escape. The stylet can be withdrawn completely for a moment to obtain an indication of the pressure under which the fluid is contained in the canal, if the pressure is normal or low and no block to the needle occurs it need not be reinserted. Should no fluid be obtained, or only a drop or two, and some doubt is felt as to the needle having entered the canal, the stylet should be advanced

to its second position, and the needle may then be pushed gently onwards until the anterior wall of the canal can be palpated with the end of the stylet. On withdrawing the needle the puncture should be sealed immediately with collodion. Local anæsthetisation of the skin is frequently taught and practised, but freezing and other methods are quite as painful, if not more so, than the stab of a sharp needle, and they increase the difficulty of puncturing exactly in the right spot. In some cases in which I had given no warning the fluid was issuing forth before the patient knew the needle was in.

Accounts vary a little as to the direction in which the needle should be pointed and the distance from the middle line and below the level of the spinous process at which it should start its journey. The truth of the matter is that a very small latitude is possible, and each operator must acquire for himself an accuracy which can only be learnt by practice.

The above details will, if studiously attended to, secure success in nine cases out of ten, even to the novice. Slight differences in the position of the patient, and possibly of the contour of the bony points, will be sufficient to require sometimes a slight deviation from the direction usually given to the needle. The sitting position is the one in which it is possible to obtain most uniform results, and the needle can usually be inserted in a horizontal direction. But this position, while practicable for spinal anæsthesia in surgical conditions, is often impracticable or undesirable in medical conditions.

When serum or other fluid is to be injected by the spinal route there are certain practical points worthy of attention. The fluid should be warmed so as to reach its destination at about body temperature. This will lessen any tendency to shock and not arouse unnecessary sensations. A quantity of cerebro-spinal fluid bearing some relation to the quantity of serum to be injected should be withdrawn if possible. Should there be a great excess of the cerebro-spinal fluid under high pressure, then the amount withdrawn must depend on the indications for that particular case. The ingoing fluid must be injected slowly. Individual cases vary greatly in the ease with which injections are admitted. Some begin to cry out about their legs at the very start, and then the injection has to be done with extreme slowness. The patient's sensations are the guide to the rate of injection admissible. It is to the mental comfort of the operator that the patient attributes the pain in his legs to an undue energy on

the part of the nurse controlling the position of these limbs, and not to the manipulations of the physician.

Complications.—Certain difficulties and complications happen now and then when performing spinal puncture. Obstreperousness on the part of the patient has already been dealt with and can always be overcome, if need be, by a general anæsthetic. Anatomical faults or conditions may lead to trouble. Curvature of the spine needs only to be mentioned. In a case of osteitis deformans, where the trunk had become shortened and collapsed, I failed to enter the canal. Great muscularity or excessive obesity are the two most common causes of difficulty under this heading, and in such cases it will be found that the full length of the 8 cm. needle will be required. In these cases it is often barely possible to feel the spinous processes, much less the interspinous spaces, and the best plan will be found to keep the left thumb on the edge of the spine and to estimate by sight the point at which the needle should be inserted. Or the plan recommended by Juvara may be tried: he depresses the tissue between two spines with an instrument resembling a paper-knife, and on releasing the pressure a mark is left on the skin indicating very accurately the level of the interlaminal space. It is necessary to remember that the skin does not bear a constant relation to the underlying parts and the slightest movement of the patient may alter a previously existing relationship. Thus a mark on the skin, or a point indicated by the guiding finger, may both become quite useless suddenly. Some patients cringe and hollow their back directly they are touched, and so undo all the good of the position into which they have been so carefully brought. With patient and reassuring conversation their nervousness can be largely overcome. Occasionally the needle will run up against the bony wall just external to the ligamenta subflava, or can be felt grazing along the walls of the bony channel; a slight alteration of the inclination of the needle will often rectify this.

Once within the canal the operator may be disappointed to obtain no fluid. The ordinary manipulations required under such circumstances have already been described. But there are a certain number of cases in which it is impossible to obtain fluid, and others in which no fluid may be obtained on the first, second, or third occasion, and yet be obtained subsequently. In the same way, if much fluid has been withdrawn on previous occasions, no fluid may be obtained on one or more subsequent

occasions. The reason for no fluid being obtained is at present theoretical. Often failure can be explained by the needle becoming blocked by tissue or blood-clot, or by the orifice becoming occluded by nerve or other tissue compressed against it. These causes can be overcome by a suitable needle such as that already described, but even then occasionally cases with no fluid will be encountered. In some cases there is reason to believe that local adhesions have taken place, especially where there has been a meningitis; or an obstruction may exist between the ventricles and subarachnoid space; or again there may be some slight abnormality of the membranous canal. In all cases a second or third puncture should be attempted through another space. A possibility to bear in mind is that the end of the needle may be buried in the septum posticum which connects the posterior aspect of the pia mater with the arachnoid mater. Changing the direction of the needle as far as may be possible should free the orifice from this entanglement. There is no doubt that fluid may collect in one part of the system of cerebro-spinal cavities and be practically absent from another part, whether due to local activity of secretion or other causes, so leading to a variable pressure in different sections of the system; and it must be remembered that the fluid travels but slowly from one end to the other of the system. This is proved by the patient slowness which needs to be exercised when injecting fluids into the subarachnoid space. Rapid injection causes local compression of the nerve elements, with pain referred to their area of distribution. The subarachnoid space of the brain is broken up by filaments and trabeculæ which form an extremely delicate meshwork; and the corresponding space of the cord is divided into three more or less distinct compartments by the ligamenta denticulata situated laterally, and by the mesial septum posticum already mentioned. Of late, therefore, when dealing with cases where no excessive increase of pressure of a chronic nature exists, or where no emergency puncture without delay is called for, I have been in the habit of raising the head of the bed on blocks for two or three hours before performing lumbar puncture, remembering to remove the blocks as soon as the operation is completed. For the same reason when injecting serums and other medicaments I raise the foot of the bed on blocks and leave it raised thus for from one to twelve hours. Of course this practice does not apply to injection of anæsthetics where it is desired to confine the action of the drug to a localised area.

On rare occasions one drop, or perhaps three or four, are obtained on puncture, and then the channel seems to be run quite dry. It is conceivable that the subdural space may at times be the site of a slight effusion, and that a localised distension of this space may be entered. Curschmann noticed that the application of cold to the skin increased the pressure of the cerebro-spinal fluid, and he successfully applied this knowledge to a case of epidemic cerebro-spinal meningitis in a child, in whom the fluid was too thick to flow through the needle, by freezing the skin of the thighs with ethyl chloride. I have made the experiment frequently in hopeful expectation, but with disappointing results. It accelerated the flow of fluid slightly in some cases—all of them cases of epidemic cerebro-spinal meningitis; but, for some unexplained reason, it has failed entirely so far in all other conditions.

It is not uncommon for a few drops of blood to precede the cerebro-spinal fluid, and for the first few drops of the latter to be mixed with blood. The fluid soon comes quite clear, however, and the tube collecting the blood-stained fluid should be discarded and a second tube, which should always be at hand, substituted, otherwise the subsequent examination of the fluid will be misleading. This blood is due to puncturing the posterior intra-spinal venous plexus and is not of any consequence. Should the needle be driven up against the anterior wall of the canal the anterior intra-spinal venous plexus is likely to be injured and is an accident of much greater importance. The blood continues to escape and to contaminate the cerebro-spinal fluid which is being collected, and also leads to the formation of considerable blood-clot in the canal. On two occasions I have had copious hæmorrhage occurring at the end of the proceeding instead of at the beginning. The cerebro-spinal fluid had been coming quite clear and then suddenly became blood-stained, to be rapidly followed by what looked like pure blood. The only course open to one in such a case is to withdraw the needle. Both the cases mentioned were in the chronic stage of epidemic cerebro-spinal meningitis, in whom suppuration had ceased and in whom the fluid was under high pressure and quite clear, except for a filamentous clot on standing. No symptoms attributable to the bleeding occurred in either case, and they both pursued the uneventful downward path common to the disease. One of the cases was punctured in the lumbar region a few weeks later, and a large quantity of yellow fluid, probably a mixture of cerebro-spinal fluid and blood serum, was drawn off,

with temporary improvement of the symptoms. Useful lessons may be gathered from these cases. The bleeding no doubt proceeded from vessels of the cord that had been corroded by the suppurative processes which had previously existed, and that ruptured when the pressure of the cerebro-spinal fluid had been relieved. A brittleness of the vessels, due to old age or constitutional disease, may lead to a similar contretemps, and warn one to exercise increased caution when relieving pressure in the spinal canal. The cerebro-spinal fluid is sometimes yellow in colour after suppurative meningitis apart from such an accident to explain it, but the process is probably not different. Note that this yellow colouration is not perceptible by ordinary artificial light, and the fluid should always be kept for examination by daylight.

When serum is being injected into the spine I have witnessed a tumour gradually rising over the site of injection. This implies either that the needle had not penetrated the meninges, or that it had been allowed to slip out partially and that the serum was escaping into the surrounding tissues. Possibly also a certain amount of the injection may force a way out along the outside of the needle.

Any other complications which may happen are in the nature of sequelæ and can almost always be traced to extracting too large a quantity of the fluid at one time. The patient may even cry out about his head at the time of the operation if an excessive amount of the fluid is withdrawn, or if it is allowed to escape too rapidly. For this reason it is wise to control the rate of the flow when the fluid is under high pressure by some such method as provided for by my needle. In less aggravated cases the pain in the head, which is very intense, and sometimes accompanied by nausea and vomiting also, does not occur till some six hours or more afterwards. The symptoms may last for an hour or two to some days. Where the cerebro-spinal fluid is not under increased pressure not more than 3 to 7 c.cm. should be withdrawn at one time. I have never seen any after results following on the extraction of this quantity. Where the pressure is increased the amount withdrawn must be regulated according to the degree of pressure, and can only be learnt by experience. A very fair guide is to stop as soon as the fluid escapes at about the normal rate, or very slightly below the normal pressure. That such severe symptoms may follow extraction of the meningeal fluid shows that the process has its indirect dangers. Continental observers have reported death as a result of lumbar puncture. Williamson quotes

Gumprecht's record of fifteen cases of immediate death; and Rons records fourteen deaths in which 25 to 90 c.c. fluid had been withdrawn. To lessen the risks of such a disastrous result the patient should be kept strictly in bed for the twenty-four hours following the operation.

Meningeal Effusion.—The diagnostic value of spinal puncture rests upon the character—physical, chemical and microscopical—of the fluid obtained. Normal cerebro-spinal fluid is colourless, clear and watery, of low specific gravity (1·004 to 1·007), and contains only a trace of coagulable proteid. These properties, and the presence of a reducing substance, differentiate it from all other serous fluids. The fluid of hydatids agrees, perhaps, more closely than any other effusion with the meningeal fluid, except in its special microscopical features. The total quantity of the cerebro-spinal fluid in health is, according to Mott, 120 to 150 c.c. The proteid consists of serum globulin with a trace of albumose, and, according to Renon and Tixier, generally varies in amount directly with the number of cellular elements present in the fluid. The albumen only amounts to from 0·2 to 0·5 per cent, but in pathological conditions it may be increased up to from 2 to 8 per cent. The number of cells is from 0 to 2 in a c.mm. of the normal fluid; over 5 cells to a c.mm. is indicative of a pathological process in the meninges. (Joffroy and Mercier.)

The pressure under which the fluid is found is of great interest and importance. The pressure in the subarachnoid space and in the ventricles should be the same. In lateral decubitus the normal pressure is 120 to 180 mm. distilled water according to Könnig, 125 mm. according to Quincke. Authorities vary as to the height pressure may reach in disease. Quincke gives 700 as the highest and Schönborn says up to 1000 mm. water. For ordinary clinical purposes it is sufficient to know if the fluid is under low, normal, high or excessive pressure, and this is not difficult to estimate by the rate at which the fluid escapes from the needle, once the normal rate for a fixed size of needle has become familiar to the eye. Sometimes directly the needle penetrates the membranes the tension is so great that the fluid squirts out in a strong jet. Allowance must be made for factors which alter the blood-pressure, such as coughing, straining or fright, for these also affect the pressure in the subarachnoid space.

The reducing substance found in the meningeal fluid is not sugar, and its estimation throws little light upon pathological conditions. But, with an advance of knowledge, it is probable

that the estimation of the quantity present of another complex chemical body—cholin—will be of distinct service. Cholin is a ptomaine in close structural relation to muscarine, but it is not nearly so toxic as this latter substance, though it may be decomposed into neurin, which is a highly poisonous body. Cholin is said to be present nominally in every cell, and it can be found in extremely minute quantity in normal cerebro-spinal fluid. It is liberated during life whenever nerve tissue is broken down in any considerable amount. It is derived from the lecithin of the nerve tissue, and may be found in increased amount in diseases associated with the destruction of the brain tissue. An interesting fact in the chemistry of the meningeal fluid is that it usually contains a higher proportion of potassium relatively to sodium than other body fluids.

The freezing point on an average is 0·52° to 0·54°, and according to Fuchs and Rosenthal (quoted by Wells) it is lowered about the same in all diseases, except in tubercular meningitis where it may be reduced to 0·43°.

Diagnostic Value. — In disease the meningeal fluid is often greatly altered macroscopically as well as microscopically, and the information to be gleaned from these alterations will now be shortly considered.

A fibrin clot may form in the fluid after standing for a time, like a cobweb to look at, in cases of tuberculous, syphilitic and serous meningitis, and in sarcoma of the meninges.

Turbidity of the fluid indicates a meningitis. The fluid may be actually purulent.

Blood in the fluid may be due to accidental causes, such as were discussed when describing the technique of the operation. But it may also be mingled with the fluid in fracture of the skull or injuries to the spinal cord, in subarachnoid hæmorrhage (spinal or cerebral), and in intra-ventricular hæmorrhages. In these pathological conditions the fluid remains yellow even after centrifuging, and the fluid is equally tinged with blood from first to last; whereas in accidental admixture of blood the first drops of fluid are most tinged, and, after centrifuging, the blood corpuscles fall and the fluid becomes clear.

A yellow colour of the cerebro-spinal fluid sometimes occurs in severe jaundice, and the fluid may also be faintly yellow, without being actually tinged with blood, in hæmorrhage of the cerebrum or cerebral membranes. This is a guide in differential diagnosis from cerebral thrombosis in which the fluid is not tinged yellow.

The *albumin* is increased in purulent meningitis, in paresis and some chronic nervous diseases, and sometimes after intracranial hæmorrhage. Pomeroy suggests, from a large number of observations which he has carried out, that the albumin content may act as an indicator when the cellular elements are absent. In a case of Nicol's which he quotes the albumin content was positive when the cellular content was negative at the first two punctures, and at the third puncture a lymphocytosis was found. This suggestion is one which deserves further investigation. The estimation of the albumin is carried out as follows:—Mix equal portions of cerebro-spinal fluid and saturated solution MgSO in the cold, and filter. This removes the globulin. Now boil the filtrate, and, if normal, it remains clear. The appearance of opalescence indicates the presence of serum albumin which is abnormal in more than a faint trace.

The cells in the cerebro-spinal fluid become much more numerous usually in those conditions in which there is an increase of albumin content. In the normal fluid, as already shown, they may be almost impossible to find, and consist of polymorphonuclear leucocytes with, perhaps, an occasional lymphocyte. There may be seen as well some structureless elements which are degenerated leucocytes. These are very common in acute meningitis. An increase of leucocytes is found in acute infective processes. A lymphocytosis may be caused by bacteria or chemical toxins, or simply by pressure due to increased secretion; and it is found in—(*a*) Some infectious diseases, *e.g.* typhoid, scarlatina, mumps, pneumonia, sepsis; (*b*) herpes zoster, chorea, disseminated sclerosis (uncertain), heat stroke (uncertain); (*c*) hydrocephalus, uræmia, tumour of brain (increase slight and probably due to pressure); (*d*) trauma to skull or spinal column without a hæmorrhagic discolouration of the fluid; (*e*) syphilitic and tuberculous infections. Lymphocytes also take the place of the leucocytes during recovery from acute meningitis. The cells are said to be normal in alcoholism, in dementia præcox, and in psychoses non-syphilitic in origin, and this forms a useful factor in differential diagnosis. The fluid collected at one puncture is not always uniform throughout. The leucocytosis is sometimes greater in the fluid which escapes first, sometimes in that which escapes last, and when this is observed it affords a possible clue to the site of a lesion. For this reason it is a useful custom to always collect a tapping in two or more receptacles.

The bacteriology of the cerebro-spinal fluid is one of the surest

and most valuable aids we have to diagnosis in pathological conditions affecting the meninges. The most valuable of all is the demonstration of the diplococcus intra-cellularis meningitidis of Weichselbaum. It can generally be found in large numbers in the pus or fibrin clot deposited by the fluid, both intra- and extra-cellular, and is easily stained by ordinary basic dyes. A growth on serum agar will confirm the diagnosis. It is described as Gram-negative, but different strains have a variable action towards Gram. Tubercle bacilli can also be demonstrated in a large number of cases of tuberculous meningitis; some say in all cases, but the search has often to be a prolonged one. The diplococcus pneumonia is a not uncommon find, and gives rise to a recognised form of meningitis. Streptococcus and staphylococcus pyogenes are both found. Other organisms identified have been the B. influenza, B. pneumonia, B. typhi abdominalis, B. coli communis, B. mallei, B. pestis, and other varieties in rare cases.

The pressure is increased in intra-cranial tumours, in extravasation of blood into brain or membranes, and in a serous or purulent effusion into the ventricles of the brain or subarachnoid space.

The diagnostic value of tapping the spine will be made clearer by a consideration seriatim of the conditions in which it is of established use, and some of those in which its future position is not yet established.

Serous Meningitis.—In this interesting and important condition relief of the pressure by spinal puncture is a most valuable therapeutic procedure and almost startling in the rapidity with which it subdues the urgent symptoms. The condition is one which is easily confused with all manner of diseases, and many of the recoveries assigned to tuberculous and other forms of meningitis, and to cases of brain tumour, probably belong to this category. The acute form may easily be mistaken for epidemic cerebro-spinal meningitis. The fluid obtained by puncture is clear and free from bacteria. The pressure is greatly increased—up to 300 according to Quincke—and a large quantity of fluid can be safely withdrawn. The albumin content may be increased and a lymphocytosis found to be present. Fuchs reports finding urobilin in one case. Blumenthal believes the condition to be a serous meningitis caused by trauma following on a primary hydrocephalus, but it is not certain that the process is inflammatory.

Hydrocephalus.—The fluid within the ventricles of the brain is under high pressure, and when the spinal subarachnoid sac is punctured the fluid issues with force. Pressure up to 660 mm. has been recorded, and Tobler reports the withdrawal of 650 c.cm. at one sitting. The colour of the fluid is clear, except for a slightly greenish tinge occasionally, and there is some increase of albumin.

Abscess of the Brain.—The meningeal fluid is under increased pressure. It is clear and free from bacteria and there is no excess of leucocytes, unless there is an extension of inflammation to the meninges, when the character of the fluid may be altered. This affords a useful guide in differential diagnosis. Extreme caution must be observed in drawing off fluid by spinal puncture in suspected abscess, owing to the alteration of relative pressures and the danger, as Schönborn points out, of perforation taking place.

Cerebral Tumour.—The fluid is clear and under increased pressure, the albumin is increased and there is a lymphocytosis occasionally. Cholin is present.

Apoplexy.—Spinal puncture may give valuable information and be a useful means for relieving symptoms, but caution must be used for fear of setting up renewed haemorrhage. The fluid may be under increased pressure depending on the amount of haemorrhage, and also corresponding to the amount of rigidity according to Froin. Should the fluid be mixed with blood, as is frequently the case, blood must have escaped into the ventricles. The colour lessens with each puncture until it is finally colourless. Albumin and cholin are both increased. The lymphocytes depend on the presence of blood.

Acute Meningitis.—Lumbar puncture is extremely useful for differential diagnosis. Bacteriological examination does not always succeed. A pneumococcal infection is the most common. The prognosis is bad in meningitis due to staphylococcal and streptococcal infection, also when the B. coli communis is present. A great deal has been written on influenzal meningitis—Kaupe mentions a case of Curschmann's in which the fluid was clear, the pressure normal, and the lymphocytes were many, but the leucocytes few; and a case of Hecht's in which the fluid was purulent and the pressure 150 mm. mercury.

The bacillus of typhoid is not often found, and the spinal fluid has no constant character in this fever. When a purulent meningitis spreads from the ear the infection is often a mixed

one. Where the symptoms and signs of a disease point to an acute meningitis, but the spinal fluid is found to be clear and free from organisms and leucocytes, Gerhardt throws out the interesting suggestion that there may be a circumscribed purulent meningitis but not a diffuse one. The question requires further investigation. In epidemic cerebro-spinal meningitis the lesion may be confined to a cerebral or a spinal area.

Epidemic Meningitis.—This disease has attracted many investigators of recent years, and in no other condition has the value of lumbar puncture as a routine practice been so well recognised, especially since the value of injecting serums or antiseptic preparations into the spinal meninges has been realised. The specific diplococcus is most easily found during the early weeks of the disease, and though no organisms may be found at the first puncture, subsequent examinations may be more fortunate. Is this a further instance of the fluid which is under high pressure escaping from below the infected area before the organisms have become widespread? In some cases no fluid can be obtained. The fluid may be under very high pressure, and up to 600 mm. water has been recorded. The fluid is sometimes clear at time of withdrawal, but is generally opalescent, grey, or quite thick—it may be too thick to pass through the needle. The albumin is increased, but the increase bears no relation to the severity of the attack. There is a leucocytosis at first, and later a lymphocytosis. The freezing-point is lowered.

Tuberculous Meningitis.—In this condition the fluid is under high pressure—up to 700 mm. water has been recorded. It is generally clear, but is sometimes opalescent, and on standing a fine core of fibrin often separates. This should always be looked for, and the fibrin clot searched for the tubercle bacillus. The albumin is increased, but the increase is only of secondary importance. The presence of large mononuclear leucocytes is an important diagnostic feature. Many polymorphonuclear leucocytes point to a mixed infection. The freezing-point is markedly lowered.

Syphilitic Meningitis.—A lumbar puncture may afford useful help when there are meningitic symptoms without any definite indications of other disease. In syphilis the fluid is clear and under increased pressure. A lymphocytosis is a characteristic feature, and there is often coagulation in the fluid. Pomeroy states that "a negative finding in a case with a syphilitic history is almost certain evidence that there is no involvement of the

central nervous tissue, and in cases where brain syphilis is clinically to be diagnosed, a persistent negative lumbar puncture should make us look for some other etiologic factor." The lymphocytosis in brain syphilis is much more marked than in brain tumour, two conditions which often present very similar features.

Sarcomatous Meningitis.—The fluid is said to be tinged brown or yellow, is of an inflammatory nature, and coagulates. Large cells similar to those of the growth have been found in the fluid, which also contains blood-pigment, and a few erythrocytes and macrocytes.

General Paralysis of the Insane.—Almost all observers agree that a lymphocytosis in the meningeal fluid is a never-failing accompaniment of a general paralysis. Joffroy, Marie, Dutlos and others say that a lymphocytosis is one of the earliest and most constant signs, and that it appears before the memory, age and ataxic symptoms. Repeated punctures at intervals of about ten days are necessary, as the first two or three may give negative results, but repeated failures contra-indicate general paralysis. It should be mentioned that Raubitschek considers a lymphocytosis only of value as a positive indication, whereas Ballet thinks where it fails the disease will advance rapidly. A few polymorphs may also be found. The albumin is always increased, but observers disagree as to how far it corresponds with the cell content. Phosphate and cholin have also been found. The pressure is increased.

Tabes Dorsalis.—As in general paralysis of the insane so in tabes the lymphocytosis is often extreme when other symptoms are very slight. The albumin varies, cholin is present, also phosphates generally. The pressure is usually increased.

Friedreich's Ataxia.—Cytology gives negative results.

Multiple Sclerosis.—Lumbar puncture gives uncertain results.

Syringomyelia.—The cerebro-spinal fluid is said to have no increase of cells. Further investigation is required.

Poliomyelitis Anterior Acuta.—Pressure of the fluid is increased. Most authorities agree there is no increase of cells. Achard's and Raubitschek's observations do not quite agree with others in that one has found a lymphocytosis and the other a leucocytosis early in the disease. The fluid is clear, but most variable results are recorded as to its bacteriological properties. Spinal puncture has a beneficial action.

Herpes Zoster.—The lessons to be learnt from the cerebro-spinal

fluid are still undetermined. There is generally a lymphocytosis, but sometimes a leucocytosis.

Cyst of Dura Mater.—A case of Schmidt's is referred to by Kaupe. The pressure was reduced and the fluid clear.

Tetanus.—Not many observations have been carried out. A lymphocytosis has been found. In a case I had some opportunity of observing no fluid was obtained until after serum had been injected on three or four occasions.

Epilepsy.—The pressure of the fluid is increased, especially at the commencement of an attack. Skorzynski found that the pressure was maintained during the tonic stage, and after fluctuating, fell rapidly with cessation of the attack. Cells are increased in number according to some and decreased according to others. Cholin is present in true and in Jacksonian epilepsy. In a case of petit mal I failed to obtain any fluid on two occasions at six weeks' interval. Curiously enough both these punctures were followed by an unusually long quiescent period—twenty-one days after the first time and twenty-five after the second without any seizure. There is an undoubted hysterical element about this patient who is still under observation, but also a true epileptic condition. Nearly three months after the second puncture I performed a third lumbar puncture one hour after I had seen her in one of her attacks. These were becoming rather more pronounced and prolonged. This time fluid was found, and it issued forth under pressure; 14 cc. clear fluid were withdrawn, and, the pressure falling rather suddenly, some sterile normal saline solution was injected to replace the excess. The patient had to be allowed to get up and go home unfortunately three hours after the operation. She felt no ill effects until another three hours had elapsed, when she was seized, she said, with severe headache and some soreness of the back. These symptoms soon passed off, however. The fluid showed no abnormality. It was not examined for cholin. The cerebro-spinal fluid is said to be tinged with blood sometimes in grand mal; a sign which probably indicates a congestive vascularity of the meninges.

Chorea—Tetany—Paralysis Agitans.—In these the fluid is normal usually. Chorea is stated to be relieved by lumbar puncture. A case of chorea with increased pressure, and another with lowered pressure, have been recorded.

Hysteria and Neurasthenia.—In these conditions the fluid gives negative results on examination.

Exanthemata.—In typhoid fever polynuclear leucocytes are found and the specific organism.

In parotitis there is a lymphocytosis during the height of the affection.

In pertussis the pressure is raised, and there is an increase of mononuclears.

Disease of the Kidneys.—In nephritis the pressure is said to be below normal.

In uræmia some record a lymphocytosis, others dispute it. The freezing-point is raised. The pressure is sometimes raised and sometimes normal.

In eclampsia the pressure is raised. One case with lowered pressure has been recorded.

Diseases of Metabolism and the Intoxications.—In diabetes the changes correspond to those in the urine.

In jaundice the fluid is yellow, but is free from bilirubin.

In alcoholism there is no lymphocytosis, and this is a useful fact in differentiating it from general paralysis of the insane and from tabes.

Insolation.—The reports on the cells found in the fluid in this condition are conflicting. The discrepancies depend possibly on differences in the severity of the cases observed. In severe cases it appears there may be a polynuclearcytosis at first, and a lymphocytosis at a later stage. The albumin is abnormal and the pressure is raised.

Incontinence of Urine.—Babinski reports a case of instant cure, but does not claim more than psychic suggestion as the remedial agent.

Diseases of the Ear.—The spinal fluid can afford valuable diagnostic aid as to the existence of a meningitis following on ear trouble, and also as to its nature.

Diseases of the Eye.—The observations recorded have been few, but in a case of syphilitic disease of the eye a lymphocytosis was found.

Conclusions as to the Diagnostic Value of Spinal Puncture.—Note should always be made of the pressure under which the fluid is ejected. The naked-eye character, the microscopical, chemical, and bacteriological properties of the fluid should be determined.

Lumbar puncture should be repeated at intervals, especially when no fluid is obtained at first.

If a case be suspected to be one of meningitis, but the cerebro-spinal fluid continues normal, the disease may be ruled out.

When the fluid gives constant negative results on examination, syphilitic affections of the brain may be ruled out.

A lymphocytosis is a constant and early sign in general paralysis of the insane and in tabes. The lymphocytosis in secondary and tertiary syphilitic conditions is not so marked.

A lymphocytosis is present in tabes, general paralysis of the insane, cerebro-spinal syphilis, tubercular meningitis, epidemic meningitis (late); and is absent in functional neurosis, epilepsy, multiple neuritis (?), alcoholism, poliomyelitis, syringomyelia. When the fluid is clear and free from organisms in purulent otitis media and in brain abscess, the prospects of operative treatment are more hopeful.

Therapeutic Value.—Lumbar puncture may be said to afford relief in all cases of intra-cranial pressure. In none is this better shown than in serous meningitis, as already mentioned. It is the most rapidly efficacious remedy we have for relieving the distressing symptoms of convulsions in children. Where the convulsions are due to gastric or intestinal disorders, and other assignable causes, the usual steps to counteract these must, of course, be taken at the same time. I have cured children in a condition of status epilepticus by a single tapping, or, at least, until other remedies acted, and have subdued the contortions of a baby with general miliary tuberculosis by tappings, repeated at a few hours' interval, so long as the fluid reaccumulated and the fontanelles bulged, without hastening the unavoidable end, and yet soothing the harrowed feelings of the unhappy relatives. Boquel records a case of convulsions in the newly-born which was cured by spinal puncture, and relief of the distressing symptoms in eclampsia may be obtained after the same manner. Chronic and intractable headaches can often be relieved, but great care must be taken not to withdraw too much fluid. For example, migraine and severe headaches due to chronic Bright's disease, uræmia, and lead-poisoning may all be relieved sometimes, and I have found an apparent cure follow an obscure case of headache. Babinski states that he has sometimes relieved Ménière's disease and deafness with auditory vertigo; Purves Stewart reports relieving a case of tinnitus aurium; and optic neuritis can often be cured, and in other cases relieved. Thieberg and Ravant state they have found lumbar puncture extremely efficacious in pruritus. As a means for introducing anæsthetics to a localised area of the central nervous system, it is rapidly gaining favour with surgeons, and similar means can be employed successfully to combat intense pain in the pelvic region and lower limbs produced by the pressure of neoplasms or other causes.

The value of the injection of bactericidal agents into the subarachnoid space is still in the experimental stage. A recent case, under the care of Dr. F. D. Boyd, suffering from the sequelæ of cerebro-spinal meningitis, was treated with collargol by this method. The reactionary symptoms were considerable, but the leucocytosis which followed was most uncertain, and less in subsequent injections than after the first. The value of the treatment seems questionable, but deserves further investigation.

In concluding this study it only remains for me to record my best thanks to Dr. Claude B. Ker and to Dr. Francis D. Boyd for the facilities they have so kindly afforded me of studying cases under their care.

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RECENT LITERATURE.

CRITICAL SUMMARIES AND ABSTRACTS.

MEDICINE.

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A Blood Reaction (Cobra-Reaction) in Nervous and Mental Diseases.

In a preliminary communication (*Münch. med. Wochenschr.*, 18th May 1909) Much and Holzmann described a blood reaction which they alleged was diagnostic of particular forms of mental disease (dementia præcox and manic-depressive insanity in particular), and their paper has led to a considerable amount of discussion. Unfortunately, it seems as though the conclusion at which Much and Holzmann arrived was premature, and that the reaction has not the diagnostic character they believed, but, nevertheless, in the work to which their observations have given rise, some interesting points have come out.

The principle of the reaction ("Psycho-reaction" or "Cobra-reaction") is simple. Washed human corpuscles are, as is well known, lysed by cobra venom. If human serum is added to the mixture of venom and corpuscles, lysis is not, as a rule, prevented. Much and Holzmann, however, stated that the serum of persons suffering from dementia præcox, manic-depressive insanity, and epilepsy with circular insanity, and also the serum of healthy persons who were members of families in which these diseases prevailed, had the power of preventing this lysis of corpuscles by cobra venom. The technique of their method, which has been more or less closely adhered to by subsequent workers, was as follows:—To ·35 c.cm. of serum is added ·25 c.cm. of a solution of 1 : 5000 cobra venom, and to the mixture is added ·5 c.cm. of a 10 per cent. suspension of washed corpuscles. Tubes are incubated at 37° C. for two hours, and are kept on ice for twenty-four hours. If at the end of that time the tube, on being shaken, is completely opaque (= no lysis), the reaction is positive. Partial or total lysis is looked on as a negative reaction. In their paper Much and Holzmann give the results of 400 tests on healthy persons, patients suffering from general diseases, and asylum cases. The results obtained are said to be very concordant—100 per cent. of positive reactions in dementia præcox and manic-depressive insanity. In some cases of healthy persons giving the reaction, a family history of these diseases was obtained, and in the comparatively few cases of reacting patients

in which the original clinical diagnosis was *not* dementia præcox or manic-depressive insanity, a diagnosis of one or other disease was subsequently, and independently, arrived at. Much and Holzmann claimed that their reaction demonstrated the somatic character of the two forms of mental disorder. The reaction gave no aid in distinguishing between dementia præcox and manic-depressive insanity, nor was it of prognostic importance. Lastly, the cerebro-spinal fluid did not give the reaction.

Geissler (*Munch. med. Wochenschr.*, 3rd August 1909) gives qualified support to Much's reaction. He examined the serum of 500 patients, and found that in 100 per cent. of clinically diagnosed cases of dementia præcox and manic-depressive insanity a positive reaction was obtained, provided that the serum was taken during the acme of the stage of excitement or depression. In stuporose conditions, in epilepsy, and in hereditarily tainted healthy persons, the reaction was absent. He met with a positive reaction, apart from dementia præcox and manic-depressive insanity, only twice—in acute chorea, and in the fluid from a case of pleural effusion. Geissler compares the value of the cobra-reaction to that of the opsonic index and the Wassermann test.

Fraenckel, Kathe, and Bierotte (*Münch. med. Wochenschr.*, 20th July 1909) make the criticism on Much's reaction, that the dose of venom selected is too small, and that the smallest trace of antilytic substance in the serum is enough to prevent lysis of the corpuscles. Different strains of corpuscles display different degrees of resistance to the venom, so that it is necessary to titrate each strain with venom, and to select as a dose a quantity of the latter just above what will cause lysis. They examined 92 serums: 8 normal persons, all negative; 26 non-mental diseases, 17 positive, 19 negative; 27 dementia præcox, 15 positive, 12 negative; 16 manic-depressive insanity, katatonia and hebephrenia, 9 positive, 7 negative; 15 other psychoses, 5 positive and 10 negative. They draw particular attention to the fact that none of the normal serums gave the reaction, but do not think that the test affords any means of differentiating psychoses.

Beyer and Wittneben (*Münch. med. Wochenschr.*, 20th July 1908) repeated Much's observations on 345 cases. They got a positive reaction in 10 per cent. of healthy persons, 25 per cent. of general diseases, and 50 per cent. of cases of insanity—dementia præcox, manic-depressive insanity, epilepsy and idiocy. Juvenile epileptics and idiots gave the reaction in nearly all cases. All those who have worked with this test believe that it depends in some way on the lecithin and cholesterin in the serum. Lecithin has to do with furthering the hæmolytic action of cobra venom, while cholesterin antagonises it. It is of interest that in Beyer's series of cases, 10 were general paralytics and gave a positive Wassermann (=high percentage of lecithin), and that 9 of these were negative to the cobra-reaction.

Eisner and Kronfeld (*Münch. med. Wochenschr.*, 27th July 1909), from a series of 65 tests, think Much's reaction has no differential diagnostic value. They found the same difficulty as other workers had done in deciding whether slighter degrees of inhibition of hæmolysis should be regarded as positive or negative. They did not adhere strictly to Much's technique, but used varying doses of cobra venom. They admit, however, the greater frequency with which the serum of mental cases inhibits cobra hæmolysis may in some way be associated with the nature of this group of diseases.

Schulz (*Münch. med. Wochenschr.*, 27th July 1909) points out that human erythrocytes belong to the group of corpuscles which are lysed by cobra venom alone (*i.e.* in the absence of serum). That is, they contain in themselves enough displaceable lecithin to "activate" the venom. Almost any serum has some degree of antilytic action. Schulz's results were not unlike those recorded. The reaction was most common in mental diseases, especially in dementia præcox; less frequent in general diseases, and comparatively rare in healthy persons. The phenomenon of which Much's reaction is an example depends on two factors: the quantity of activating, and the quantity of inhibiting substances in the serum—the lecithins and the cholesterins.

Plant (*Münch. med. Wochenschr.*, 27th July 1909) obtained results very unfavourable to Much's reaction, inasmuch as the majority of his cases of dementia præcox and manic-depressive insanity failed to react, and many patients with no sign of these diseases gave positive reactions. Plant's cases were practically all chosen from a psychiatric clinic, so that his results afford no information as to the relative frequency of the reaction in mental and non-mental diseases.

An unfavourable opinion has also been expressed by Hirsch and Poetzl (*Wiener klin. Wochenschr.*, No. 27, 1909), and by Hubner (*Deutsche med. Wochenschr.*, No. 27, 1909). Bauer has found that the umbilical blood of the newly-born infant is almost always strongly antilytic (*Münch. med. Wochenschr.*, 6th July 1909).

It is evident that, so far as claims were made for the cobra-venom reaction as a differential test of dementia præcox and manic-depressive insanity, the reaction fails, but in view of the growing importance which is being attached to the lipoids in pathology, the existence of a reaction which, like Wassermann's reaction, depends on variations in their relative amounts in the blood, may yet prove of value in throwing light on morbid processes.

SURGERY.

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Spinal Anæsthesia in 1908-9.

It would be difficult to name a method of treatment about the merits of which more variable opinions have been expressed than spinal anæsthesia. Not long since, Murphy declared that a statutory enactment should be passed against its use, while on the other hand Ryall, in opening a recent discussion at the West London Medico-Chirurgical Society,[1] described it as a method of the utmost value to suffering humanity. To arrive at the truth about a matter on which there is such diversity of opinion is far from easy. In 1907 and 1908 the writer gave in this *Journal* a short summary of results attained in using spinal anæsthesia, and the present brief account of more recent work on the subject may be of value in indicating the present position of the matter.

One of the most striking recent contributions to the subject was that made by Mr. Canny Ryall in opening the discussion referred to above. He has adopted Jonnesco's plan of adding small doses of sulphate of strychnine to the anæsthetising drug introduced into the spinal canal, and states, without qualification, that the danger of respiratory paralysis setting in can be thereby prevented. Jonnesco's practice was founded on a series of experiments on animals, in which he found that the marked tendency of stovaine to cause respiratory paralysis could be counteracted to a large extent by injecting strychnine along with it. Mr. Ryall uses novocain instead of stovaine, and such is his belief in the efficacy of his novocain-strychnine combination that he does not hesitate to introduce it into the spinal canal at any level. In order to obtain a high anæsthesia he injects between the first and second dorsal vertebræ, and for lower anæsthesia he injects in the mid or lower dorsal regions. He states that he can produce anæsthesia extending over the whole body, including the head and neck, and that the nature of the operation and the age of the patient make no difference. He apparently regards the danger of wounding the spinal cord as so slight as to be no bar to his method of dorsal puncture, and he records no bad results of any kind. Till a very much fuller account of a large number of cases has been recorded, he is not likely to have many imitators. The record is of interest, however, as showing the extreme lengths to which enthusiastic advocates of spinal anæsthesia are prepared to go.

One of the most illuminating discussions which have taken place

on spinal anæsthesia was held at the Société de la Chirurgie in Paris in 1908.[2] More than twenty surgeons took part in it, the great majority of whom had personally made use of spinal anæsthesia induced by stovaine. The value of the opinions expressed and the facts recorded is considerable, because many of the speakers were men who had no special interest in spinal anæsthesia, but who had given it a fair trial to test its merits, and who recorded their experiences without any particular bias influencing them one way or the other. The enthusiasts for spinal anæsthesia were also well represented, and the contrast between their results and what may be termed the average results was remarkable. Tuffier, Chaput, Jonnesco, Pouchet and Jeanne were all in favour of the continued use of spinal anæsthesia. None of them had bad results of any consequence to record. Tuffier, who, it may be remembered, has been a determined advocate of the method since its first introduction, stated that he regarded it as indicated in operations on the lower extremities, perineum, vagina, urethra, prostate, anus and lower rectum, folds of the groin and hernial regions. He had completely abandoned its use for major operations on the abdomen and thorax except under special circumstances when other forms of anæsthesia were inadmissible. As proof that spinal anæsthesia was a method of real value, inasmuch as it occasionally allowed operations to be done which could not otherwise be carried through, he narrated two cases of major operations on the pelvic organs in women in which general anæsthesia had been tried and abandoned on account of the dangerous condition of the patients, and in which the operations were afterwards successfully done under spinal anæsthesia. The majority of the other surgeons taking part in the discussion had more or less unfortunate experiences to record. Hartmann, Delbet, and Beurnier recorded, in all, five deaths attributed by them directly to the toxic action of the stovaine injected. The doses used in these cases were high, 7 and 8 centigrammes of stovaine, but others habitually use as large or even larger amounts. None of the patients were desperately ill, and all died suddenly, soon after the injection was made, apparently directly poisoned by the stovaine. Delbet and Legueu each recorded a case where death followed, weeks after operation, from paralysis and its effects. Legueu further recorded in his series of 313 cases, two cases of very serious collapse threatening death and preventing operation, one case followed by paralysis of the bladder for nine months, and a case of partial paraplegia with incontinence of urine and prolapse of the anus following a radical cure of hernia and lasting for months. Nélaton, Guinard, and Reynier related cases of paralysis coming on weeks after operation, in one case causing death, which they attributed to the use of stovaine, although absolute proof of the cause of the paralysis was not possible. Le Dentu recorded two cases of paralysis of the shoulder muscles lasting two to three

weeks. A number of cases of paralysis of the bladder for varying periods, of the rectum, the external rectus of the eye, etc., were also related. In addition, nearly all reported a number of complete or partial failures to induce anæsthesia, cases of collapse of varying severity during operation, and the frequent occurrence of severe and protracted headache or neuralgia, following anæsthesia.

The melancholy list of casualties recorded in the discussion forms a very grave indictment against the use of spinal anæsthesia, at any rate as practised in France, where the method commonly employed appears to be the injection of a relatively concentrated solution of stovaine into the spinal canal.

Prof. Barker,[3] the chief advocate of the use of stovaine in this country, adopted in his last paper on the subject a more guarded tone than in his previous communications. He recorded two cases "in which the fatal issue was contributed to by the method employed." He stated further that throughout his series of 300 cases "marked pallor" was not unusually noted as coming on soon after the injection. This apparently corresponds to what is usually described as more or less severe collapse, by other writers. Great stress is usually laid by the advocates of spinal anæsthesia on its value in preventing shock owing to the blocking of afferent nerve impulses from the field of operation which it causes. The value of a method which, in preventing operative shock, is itself liable to cause collapse, is, to say the least of it, not very apparent.

At the German Surgical Congress[4] held this year, various methods of inducing anæsthesia were discussed, and several surgeons gave their experience of spinal anæsthesia. Borchardt recorded a death following a dose of 6 centigrammes of tropacocaine in a patient suffering from enlargement of the prostate but otherwise in good health. The post-mortem examination revealed an extra-dural hæmatoma reaching from the puncture to the second cervical vertebra. There was no sign of bleeding when the puncture was made. Holländer recorded a case where the needle had broken in the spinal canal and a laminectomy was required for its removal. Braun, after an extensive trial of spinal anæsthesia, declared his opinion that it was more dangerous than narcosis. Bier,[5] in speaking to the discussion, referred to spinal anæsthesia as being still a dangerous method. He had seen two deaths, due to overdose (in one of these only 6 centigrammes of tropacocaine were injected, an amount regarded by many as a normal dose). He was of opinion that the method was certainly not yet suited for general practice.

Apart from the method advocated by Mr. Canny Ryall no important changes in methods have been published during the past year. A number of surgeons, including Bier,[5] have tried combining scopolamine-morphine injections with spinal anæsthesia. Scopolamine-morphine

injections have dangers of their own, and their use is not likely to lessen the risks attending spinal anæsthesia.

In reviewing generally the most recent results published regarding the use of spinal anæsthesia, it is apparent that there is as yet no sign of general agreement as to the best drug to use or how to use it. The indications for the use of spinal anæsthesia are differently stated by nearly every writer of note. Further, it must be admitted that results have shown that its use in constitutionally healthy individuals, suffering, say, from accident or physical defect, such as hernia, requiring operative treatment, is not free from danger to life or the risk of setting up grave disturbances in the nervous system.

Lastly, although its use in patients gravely ill is often attended by remarkably little disturbance, it is apt, not infrequently, to produce a condition of collapse probably as or more dangerous than the depression attending the use of a general anæsthetic.

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OBSTETRICS AND GYNÆCOLOGY.

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Sectio Cæsarea Abdominalis Inferior.
(*Extra-peritoneal Suprasymphysary Section.*)

By reason of the advances which have recently been made in the technique of obstetrical surgery it is now possible to perform Cæsarean section with an exceedingly low maternal mortality (1 per cent. to zero, according to Pfannenstiel), always provided that the operation is carried out early in labour on a patient who has not been subjected to handling. In such cases the ordinary conservative Cæsarean section can hardly be improved upon, more especially if the incision be made fairly high in the anterior wall of the uterus. But a very different state of matters holds with regard to Cæsarean section performed late in labour or upon women who come under the operator's care only after several vaginal examinations have been carried out by midwives, and after attempts, repeated attempts, have been made to deliver the child by forceps. In such cases the maternal mortality after Cæsarean section is so great that obstetricians, both on the Continent and in this country, prefer to do craniotomy, or, at any rate, to remove the uterus

as well as the child if they open the abdomen. Munro Kerr (*Operative Midwifery*, p. 404, 1908), for instance, writes: "In recent years I have made it a rule never to perform Cæsarean section in cases which have been interfered with prior to their coming under the care of myself or my assistants, unless the deformity of the pelvis is so extreme as to render craniotomy impossible, or more dangerous to the mother than Cæsarean section. I am compelled, therefore, not infrequently to perforate a living child."

Now, it is in order to meet such cases that the German obstetricians have, during the past two years, been endeavouring to discover an extra-peritoneal mode of ingress to the uterine interior, so as to make infection of the peritoneum with foul amniotic fluid, &c., impossible. It is to deal successfully with these infected cases, with these patients in whom there is at least a strong suspicion that during labour a septic or sapræmic intra-uterine state has been either actually established or prepared for by handling, that the *sectio Cæsarea abdominalis inferior* or *suprasymphysary extra-peritoneal section* has been introduced into obstetric practice. Obviously, if the infant can be extracted by a route which does not place the interior of the uterus in communication with the peritoneal cavity, the risk of infecting the latter will be greatly diminished, although, of course, the chances of infecting the extra-peritoneal route (which has been chosen) will be found in its place. Still, if the route selected lie in the cellular tissue, the chances of fatal results following infection will be much less.

It was considerations of this kind that led *F. Frank* of Cologne, in 1907 (see Literature for references), to propose and carry out supra-symphysary delivery. Keeping in mind the changed relations of the bladder and of the peritoneum in the later weeks of pregnancy and in the first stage of labour which make it possible for the operator to approach the lower uterine segment and the cervix through the cellular tissue underlying the utero-vesical fold of peritoneum, Frank put the patient in the Trendelenburg position and made a transverse incision about 12 cms. in extent through the abdominal wall about two finger-breadths above the symphysis pubis. This incision passed through the skin, subcutaneous tissue, musculature, and also through the peritoneum. The bladder, which was pulled up above the symphysis, was drawn forward; the utero-vesical fold of peritoneum also lay above the level of the symphysis, and was quite visible. This fold was now separated from its firm connection with the bladder transversely, and was raised up so much from the underlying tissue that a large part of the lower uterine segment was laid bare of peritoneum. The raising up of the peritoneum was continued to right and left, and thus a peritoneal flap was formed, consisting of the utero-vesical fold and that of the broad ligament. This flap was fixed to the parietal peritoneum in the upper margin of the incision, and in this way the peritoneal sac was entirely

shut off, the bladder (with its fundus covered with the resected piece of peritoneum) being outside the peritoneal sac. A transverse incision about 8 cms. in extent was then made in the lower thinned-out uterine segment, and through this opening the head and body of the child were expelled by means of pressure from above. The placenta was immediately removed. A plug of iodoform gauze was placed in the uterus and brought out through the abdominal wound, the uterine wound was closed with catgut, and the abdominal incision with silk (with the exception of the opening left for drainage). The gauze was removed on the fourth day, and the patient rose on the eighth day, and left the hospital on the twelfth. Such was the method employed by Frank in one of his thirteen cases, and there were only slight differences in the others: thus, in one, instead of dividing the peritoneum, he made a small window in it to the left of the bladder, so as to control the separation of the utero-vesical fold by sight, closing it again with catgut. All the mothers recovered.

Frank claimed for his operation that blood was saved, and that peritonitis was prevented, the uterus remaining in the peritoneal sac, and the intestines being kept out of the way. Further, the time when the operation could be safely performed was lengthened, and infected or suspected cases could be undertaken with less risk. As he himself put it, he produced a sort of artificial rupture of the uterus without the peritoneum being involved. Of course it was not an absolutely extra-peritoneal operation (being rather transperitoneal), but it was practically so.

It was not long before other operators followed in Frank's footsteps, but modifying, in certain directions, the technique he had employed. Thus, in *Veit's clinique*, Fromme made a longitudinal instead of a transverse incision, and cut down right through all the layers of the anterior abdominal wall. This incision was about 12 cms. in length, began at the symphysis pubis, and kept to the linea alba. A longitudinal incision was then made in the uterine peritoneum in the middle line from the lowest point in the utero-vesical fold up to the place where the membrane ceased to be detachable from the uterus (a distance of 10 or 12 cms. after the uterus had been in action). The peritoneum was separated on each side, and united with the parietal peritoneum by a continuous suture, or with clamps. A longitudinal incision was then made in the uterus, the child and placenta were removed, the uterus was sutured, the peritoneal folds were sutured, and finally the fascia and skin were brought together. It was thought that a transverse uterine incision was simply a disadvantage; and the gauze tampon was not used, the various layers being united together after the peritoneal folds had been set free again.

Sellheim was one of the first operators to modify Frank's procedure. After pointing out the anatomical disposition of the parts which ren-

dered an extra-peritoneal operation possible in late pregnancy and in labour, Sellheim described his operation thus: The patient was put under scopolamine-morphine and spinal anæsthesia, and a transverse incision (from 15 to 20 cms. long), slightly concave upwards, was made about 5 cms. above the upper border of the symphysis pubis. This divided the skin and subcutaneous tissue down to the fascia. Bleeding points were secured, and then the fascia was divided transversely to the same extent as the skin. In this way two flaps of skin and fascia—a superior and an inferior—were formed, and these were fixed by silk sutures above and below, so that the linea alba was exposed to view for a distance of 15 cms. in the incision. The recti muscles were divided, and the peritoneum and subperitoneal connective tissue were set free from the under surface of these muscles. The bladder was filled moderately full in order to indicate its boundaries, and the peritoneum was then separated from it, at the sides by swabs, and in the middle line with the help of scissors. In this way the vesical fold of peritoneum was separated up to the body of the uterus. The bladder was then pulled forward against the symphysis with a retractor. The wall of the cervix uteri was then divided longitudinally in the middle line, and the lips of the incision were fixed with fine catch forceps; the incision was then prolonged towards the vagina in the one direction, and up to the body of the uterus in the other, and pairs of forceps were used to draw on the angles of the incision. The bag of membranes, if unbroken, was now ruptured, and a few minutes allowed to elapse to enable the uterus to contract; then the child was brought through the incision, the natural efforts being aided by pressure on the fundus uteri. A single blade of the forceps could be used as a lever to bring the head out of the pelvic inlet into the wound, or pressure could be exercised *per vaginam* for the same purpose. The cord was tied, and an injection of ergotin was given; time was given for the uterus to contract and expel the placenta, and some help was supplied by pressure. The uterus was packed with gauze, which was carried into the vagina. The uterine incision was closed with deep catgut sutures covered in by a continuous catgut suture bringing the parts together. A few sutures were used to fix the bladder in position, and then the other layers which had been divided (muscular and fascial) were united by sutures. The patient was changed from the Trendelenburg into the horizontal position, and the skin incision was closed with Michel's fixing bandage and a sand-bag. Slight variations in technique might be needed according to differences in the mode of attachment of the peritoneum to the bladder and utero-vesical pouch. Sellheim reported two cases in his first paper, but in a later one he stated that he had delivered twenty women by the extra-peritoneal method; the plan then used was called by him the establishment of a utero-abdominal fistula for the passage of the infant and placenta. It consisted in

opening as usual into the abdominal cavity by sagittal incisions; but before proceeding further the parietal peritoneum was united by a continuous suture to the skin margin, and then the peritoneum of the uterus was incised, lifted up, and fixed by interrupted sutures to the cutaneo-peritoneal margin above referred to. In this way the child could be delivered through an opening entirely shut off from the peritoneum, through a *fistula* in fact (Sellheim, method ii.).

It has been noted that Sellheim employed Pfannenstiel's incision through the abdominal wall, and it has now to be stated that *Pfannenstiel* also modified Frank's original operation. He made the typical transverse incision (15 cms. long) at the level of the anterior superior iliac spines; he reflected the aponeurosis of the rectus muscle up to the symphysis and down to the umbilicus (the patient being in the Trendelenburg position); he next incised the peritoneum longitudinally for about 10 cms., and then made a careful cut into the cervix between the bladder-reflection and the contraction-ring. He guarded the peritoneum against infection with amniotic fluid by pads, &c. Pfannenstiel pointed out that if one did not operate too early the bladder was found resting against the vagina and not against the cervix, and so it was unnecessary to separate it from the underlying parts. But if the plica vesico-uterina was still high up, this fold was incised and separated from the bladder, and the latter was pushed downwards (as in the operation for fibroids of the uterus). The child was delivered by pressure or extracted by the feet. While the placenta was separating, a beginning could be made with the closing of the wounds and the cleansing of the parts. Then the cervix was sutured and the abdominal wound closed. This operator poured olive oil into the peritoneal cavity during the operation so as to protect it against the invasion of microbes. Pfannenstiel reported a case delivered as above described, and Rubeska soon afterwards recorded another instance in which he had employed Pfannenstiel's method, which was quicker and simpler than Sellheim's. Baumm also modified Frank's operative procedure; one of his two patients died from an abscess of the pelvic cellular tissue, showing that in infected cases the peritoneum was not the only avenue of entrance of danger.

After these operators had opened up the way a great many others followed, among whom may be named Küstner, Spaeth, Czyzewicz, Fraipont, Hofmeier, Blumreich, Luchsinger, Wiemer, Uthmöller, Zweifel, von Franqué, Hammerschlag, Kahn, Nijhoff, Veit, Klein, Kroemer, and Ballerini in 1908, and Döderlein, Jahreiss, Latzko, Dobbert, Franz, Freund, Jung, Fuchs, and Nürnberger in 1909.

Küstner, for instance, reported two successful cases in which he employed Sellheim's first method. Frank's effort had been to get an entirely extra-peritoneal method, but the technical difficulties were great, and transperitoneal operations had been a sort of compromise;

Sellheim had been the first to reach a suitable technique. In a later communication Küstner reported two other cases in which he had departed somewhat from Sellheim's method; in one of these the peritoneum was torn, and a fatal issue followed; in the other a longitudinal incision was used with drainage of the wound. *Spaeth*, also, found the difficulty of separating the peritoneum from the bladder so great that he abandoned the extra-peritoneal method in the course of the operation, and simply performed an intra-peritoneal Cæsarean section of the cervix. *Czyzewicz* pointed out the necessity of ascertaining the degree of distension of the lower uterine segment, the state of the bag of membranes, the arrangement of the peritoneal folds, and the relations of the bladder, in order that the best method of operating might be devised. In the case which he reported he used Sellheim's method, and was able to separate the vesical peritoneum without difficulty: the operation lasted 42 minutes; 9 minutes elapsed before the extraction of the child, 3 were sufficient for the birth of the placenta, 8 for the plugging of the uterus, 10 for the closure of the cervical incision, and 12 for the rest of the procedure. He was of opinion that an entirely extra-peritoneal operation was possible in the normal anatomical relations of the parts. *Fraipont* reported four cases in which he used Sellheim's method, and regarded the technique as simple and easy. He made a small peritoneal opening accidentally in one case, but it was easily closed with a pair of forceps. By this time it was becoming apparent that the two great gains achieved by the Frank-Sellheim procedure were the saving of the peritoneum from infection, and the lessening of bleeding from the uterine incision; and *Hofmeier*, recognising the difficulties of always making the operation truly extra-peritoneal, proposed that only for infected or suspected cases should we try to do so, and that for untouched ("clean") cases we should secure the advantage of less hæmorrhage by making the uterine incision low down in the interior wall, just above the symphysis pubis. *Wiener* attempted to define more exactly the indications for the new suprasymphysary section as compared with the classic Cæsarean; and *Uthmoller's* case showed some difficulties which might suddenly arise in attempting to carry out the extra-peritoneal plan (he was operating for osteomalacia). *Zweifel* brought these new procedures prominently under the notice of obstetricians in Great Britain at the meeting of the British Medical Association in July 1908; he stated that the main feature of extra-peritoneal abdominal hysterotomy consisted in detaching the peritoneum from the bladder and uterus as far up as that membrane was lightly adherent, and pointed out that it was very difficult to do so without producing lesions, but easy and advisable when there was no fear of small apertures. Zweifel himself intentionally made a small *transverse* incision through the peritoneum above the vertex of the bladder to enable him to detach the membrane by sight, and then closed the

incision with sutures before opening the uterus. Of four cases thus dealt with all recovered, but one had an abscess; forceps extraction was needed in all. *Otto von Franqué* reported a case in which but for the Frank-Sellheim operation he would have had to perforate a living child; the presence of signs of intra-uterine infection *sub partu* excluded the classic Cæsarean section and pubiotomy, and left craniotomy and extra-peritoneal section as the alternatives. The writer chose the latter because the child was living, and because by its means he was able to shut off the peritoneum entirely from the opening made in the uterus. The question of drainage of the wound was, he thought, a matter to be determined by the degree of infection and other circumstances. *Hammerschlag* and *Kahn* reported cases, and commended the operation as one that was safe and practicable and likely to lessen the use of the classic Cæsarean section, of vaginal Cæsarean section, and of hebosteotomy. *Kroemer* reported nine cases operated on in Bumm's clinique by Sellheim's method; in eight the indication was a contracted pelvis, and in one eclampsia; the eclamptic mother died. In seven of the cases the purely extra-peritoneal method was employed, and in two the transperitoneal (both according to Sellheim's technique). *Ballerini* put on record the first case treated by the extra-peritoneal plan in Italy; the indication was a cancerous tumour blocking the pelvis, and a transverse Pfannenstiel incision was made in the abdominal wall, whilst the cervix was also divided transversely, because it did not seem to the operator that there would be room enough for a longitudinal incision. There was considerable hæmorrhage from the uterine incision, but the patient recovered.

During the present year (1909) further contributions have been made to the subject of extra-peritoneal suprasymphysary section, of which, perhaps, that from Döderlein's pen is of the greatest interest. *Döderlein* has pointed out that most of the so-called extra-peritoneal plans in use are really transperitoneal, and that this is due to the difficulty or impossibility of separating the peritoneum from the bladder. He has therefore devised and practised a method of gaining access to the lower uterine segment from the side. He makes a Pfannenstiel transverse incision, separates the right rectus muscle from the underlying peritoneum, and gets his fingers in at the side in much the same position (but to a greater extent) as is done for subcutaneous hebosteotomy; in this way he reaches the uterus by a route which is entirely extra-peritoneal. There may be less room to extract the child, and the operator may come upon the ureter, but Döderlein thinks these difficulties can be got over. Apparently *Latzko* had already described a similar operation prior to the publication of Döderlein's article. *Freund* of Strassburg put on record two completely extra-peritoneal operations afterwards; and since then, *Fuchs* has operated according to what he terms the Latzko-Döderlein method. At present,

therefore, the technique is in a transition stage, and ere long it will be determined whether it is necessary to insist upon an entirely extra-peritoneal route, and, if so, whether access is best got from the side or the middle line.

There seems to be little doubt that these various operative procedures collectively mark a decided forward step in the technique of Cæsarean section, especially in cases in which there is no security that the uterine interior has been kept germ free. It may also turn out that this extra-peritoneal route will be found useful, not only in cases of contracted pelvis, but also in threatening uterine rupture in shoulder cases when the infant is still alive. All operators are agreed that the bleeding from the incision is much less, and that it is a safety and a comfort to have the peritoneum shut off and the intestines kept out of the way. The operative details, however, may yet undergo revision.

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OPHTHALMOLOGY.

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Serum Treatment in Diseases of the Eye.

Professor Deutschmann of Hamburg (*Ophthalmoscope*, December 1908) recommends a serum which he prepares from horses which are fed with prescribed doses of yeast in a certain definite manner for the purpose of obtaining their blood-serum. This is known as the "Deutschmann Serum." There is another prepared from the same active material of the serum, which is precipitated by a method devised by Dr. Enoch and then again dissolved in water, which bears the name of "Deutschmann Serum E." This latter product, dispensed in bottles of 2 c.cm., has the advantage over ordinary serum in that it possesses double the concentration of the last named. Moreover, it never produces any kind of so-called serum-sickness. The author has found it beneficial in infections of the eye, such as severe corneal and metastatic inflammations. It exerts no harmful effect, and in the presence of a fever the temperature is reduced. The serum is best injected intra-muscularly in the anterior chest wall or lateral abdominal wall. In children, doses of 1 c.cm. are injected; in adults, 4, 6, and finally 8 c.cm. twice, thrice, or oftener weekly, according to the effect obtained. The doses are then slowly reduced. The dose in the beginning should be large, and then reduced when a decided improvement has taken place. In non-feverish patients, and to this class belong most of the eye cases, the dose must be arranged according to the severity of the disease. The treatment must not be lengthened out by a series of small doses, but, as already stated, should begin with a large one, which must be reduced only when a decided improvement has taken place; 2 c.cm. to 4 c.cm. E. is evidently only a medium dose for an adult, 2 c.cm. of this solution being the smallest commencing dose. In any case, large doses are certainly necessary to battle successfully under certain circumstances with a severe eye disease of an infective nature, and a sufficiently high one can often decide the fate of an eye, as it can, indeed, the fate of the whole organism. A large proportion

of the negative results might certainly be traced to an insufficient dose of serum, and since with the serum, especially with the modification E., the slightest harm cannot be done, so massive doses are not only permissible but positively indicated.

If for any reason intra-muscular injections be impossible, then the remedy can be introduced *vid* the rectum, although the action then is not so assured, and the dose must be increased, by reason of the uncertainty of sufficient absorption by the rectum. The author states that the polyvalency of his serum might cause surprise as regards the positively proved specificity of the anti-material, and although his serum is obtained in quite a different way from all other sera, the explanation of the polyvalency of the same presented great difficulties with regard to its trustworthy action. Every other serum is obtained through the microbes concerned or their products, against which, later on, the serum of the animals treated will be active, as it becomes incorporated in the blood-passages. Deutschmann feeds the animals upon living yeast cells: thus in the digestive tract of the animals chemical processes are set up, the products of which are carried to the blood with the aid of the lymph stream.

Thus the experiments made with this serum show that it is not bactericidal, works non-antitoxically, and cannot opsonise even the micro-organisms against which it acts. Deutschmann has demonstrated that with animals fed on yeast, as a final result of complicated chemical processes in the digestive tract, a stuff is thrown into the circulation, which, when the animal organism is bacterially infected so that its cells are obliged by the throwing out of amboceptors to form antibodies of a specific nature, brings fresh nourishment and fresh energy to those active cells, so that they cannot be injured by the production of specific antibody. This stuff, with the serum of the fed animals, is brought into the human organism by means of injections, there to become active in a way similar to that just described against microbic disease. The serum treatment, the author states, forms a permanent support of the natural curative process in the human organism—a support in the battle against microbes, which have forced an entrance. It already results that, with improvement commencing, one must not break away at once from serum treatment, but continue it for a shorter or longer time according to the severity of the disease, in order to avert a possible exhaustion of the cells preparing the antibodies. The harmlessness of the serum amply justifies experiments upon the most extensive scale.

Zimmermann, Görlitz (*Ophthalmology*, April 1909), has employed Deutschmann's serum in a series of cases of infected wounds and ulcers, and as the result of his experience he concludes that it cannot be justly said to be inert *ad acta*, if one must still be cautious in judging of its action upon diseased eyes. In cases of pneumococcal ulcer, iritis and post-operative infection, if employed early, it seems to be, without

doubt, of value. Much seems to depend upon its proper administration. Its possible value as a prophylactic agent must be considered in cases of suspicious perforating wounds of the globe and in cataract operations in decrepit persons, or in the presence of other conditions in which infection might eventually be feared.

Because of its absolute harmlessness Zimmermann states that the extensive use of the serum is to be desired, and it is better to use it a day too soon than an hour too late.

Zimmermann has employed Behring's diphtheria serum in a series of twenty-eight cases of inflammatory and traumatic conditions of the eye. When the initial dose is 1500 units he finds that in many cases only one injection is required to bring about a cure. If 1000 units were first used, as was the case in decrepits, the result was less favourable, and a repetition of the dose did not have nearly the effect of a large initial dose. If an early beneficial effect is not noted, no further improvement will result from repeated injections. In not a single instance was any complication noted—no skin exanthemata or any subjective disturbance. Zimmermann says that, while in his series there are some cases in which a combined local and serum therapy was employed, he is convinced that eyes were thus saved that would have been lost notwithstanding energetic surgical treatment. The list treated contains cases of infected corneal ulcer, post-operative infection and severe irido-cyclitis, traumatic cataract, gonorrhœal iritis, orbital cellulitis from infection. Of these, four cases were unsuccessful—one of acute post-operative infection, two large septic ulcers of the cornea, and a case of purulent dacryocystitis.

Darier (*La Clinique Ophtalmologique*, July and August 1908) states that the antidiphtheritic serum has an action more marked than all the sera employed in ocular therapeutics. He upholds the view that there is a serum, as yet undiscovered, for the overcoming of all the known pathological bacteria, that the antidiphtheritic serum is very serviceable, especially for destroying the toxins of the pneumococcus not only where the micro-organism is making eye lesions (especially corneal ulcers, hypopyon, as well as irido-cyclitis, both traumatic and endogenously septic), but that he believes that sepsis from other micro-organisms may be neutralised by this serum. Darier believes, therefore, in a non-specific serotherapy—a para-specific anti-infectious serum—that the antidiphtheritic serum, from its results locally on pneumococcic lesions in the eyes as well as its systematic effect on pneumonia, is a producer of antibodies other than those essential for the destruction of the diphtheritic bacilli. Darier gives details of several new cases in his interesting paper successfully treated by the diphtheritic serum of Roux (the serum which is chiefly used in France), the dose of which is 10 c.c., repeated every day or every second or third day. In post-operative eye sepsis Darier has had marked success with this serum.

In the current number of *The Ophthalmoscope* we have an interesting statement from Deutschmann regarding his serum. The paper, which was delivered at the Oxford Ophthalmological Congress in the middle of July last, contains the author's present views, after a somewhat prolonged trial of his serum treatment. The diseases in which he has met with most success are principally suppurative processes affecting the eyeball and its adnexæ, as the orbit, the lachrymal gland and sac, and the glands of the eyelids.

Like von Hippel and Zimmermann, Deutschmann obtained the best results from using his serum in cases of *ulcus serpens* (*hypopyon keratitis*). As a rule, by its employment the author was able to avoid the use of the galvano-cautery, and he is convinced that in a preponderating number of cases treated by his serum the diseased process can be favourably influenced and cure can be obtained with slight scarring only. At the same time, Deutschmann states that he has never affirmed, nor even imagined, that every case of *ulcus serpens* could be cured by his yeast-serum. The serum, like every other known method of treatment, may fail, although at the present moment he could say that he knew of no more potent remedy for these infective ulcerations of the cornea. Deutschmann's opinion coincides with that of many others of his colleagues who have found cases of severe ulcus serpens yield to his serum when all other therapeutic measures have failed. This fact cannot be gainsaid, he affirms, even although a few observers are still inclined to deny the good effects produced by yeast-serum when employed in the treatment of ulcus serpens. Were it otherwise, one would be compelled to deny the efficacy of the galvano-cautery or of Saemisch section, because in his experience both may fail upon occasion.

Deutschmann emphasises the importance of employing the yeast-serum with promptitude, and not to tarry until all possibility of help has passed.

The yeast-serum exerts a beneficial result on iritis, whether spontaneous, post-operative, or connected with infective conditions of the organism, and it frequently yields good results in cases of serous iritis. Some instances of inflammatory exophthalmos have been cured by the serum, and that without surgical or other treatment.

As to infectious processes in the vitreous, the author admits that such cases are very difficult to influence by any kind of serum. Large doses of yeast-serum, together with repeated paracentesis of the anterior chamber, for the purpose of furthering the penetration of the antibodies into the vitreous, may sometimes give a favourable result.

When infection is apprehended, as in operations or perforating wounds of the eyeball, the prophylactic use of yeast-serum is to be recommended. All observers, including among the number those who deny the curative effect, must admit that Deutschmann's yeast-serum,

even when used in large doses, has never caused the slightest harm to the patients, since by Enoch's method the active principles of the serum are precipitated and then dissolved in water. The dose and the manner and place of injections are the same as advocated previously, and these injections are reduced only if distinct improvement is observed, and are continued for a longer or shorter time until healing is assured.

Deutschmann further points out that his yeast-serum has been found to be of service in the treatment of human infective diseases generally, and further, that it has shown itself to be an excellent adjuvant in the treatment of pneumonia, scarlet fever, measles, and general septic and pyæmic invasions. He again cautions us that it must be injected early enough and in adequate doses. No benefit can be expected from the remedy when it is given to an exhausted patient almost in the throes of death.

The author concludes his paper by unreservedly recommending his serum in suitable cases, all the more so since its harmlessness is confirmed by all observers.

PATHOLOGY.

By THEODORE SHENNAN, M.D., F.R.C.S.,
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THERE still exist in our midst sceptics as to the value of the antitoxin treatment of diphtheria. It is difficult to understand how anyone can withstand the evidence which has been accumulating from all sides since 1894, and which demonstrates to the receptive mind how great the real progress has been since the introduction of this great therapeutic measure. Certainly those of us who have experienced diphtheria epidemics in the pre-serum days have little patience with individuals who deliberately close their eyes to what is so obvious. One of the latest papers comparing the pre-serum with the serum period is by Schönholzer. He discusses the results obtained in the diphtheria station of the Zürich Surgical Clinique. For the graphic representations of these results, the reader must refer to the original paper in the *Correspondenz-Blatt für Schweizer Aerzte*, Mai 1909, S. 297. Schönholzer divides the cases into two series—those occurring between the year 1881 and the year 1894, in the course of which the antitoxin treatment was introduced, and those occurring in the period from 1894 to 1908. In the former period 1336 cases were treated, of which 536 died (39·97 per cent.). Out of the whole number, 662 cases were operated upon, and of these 438 (66·16 per cent.) died ; of the remaining 674 cases, which were evidently less severe, 96 (14·24 per cent.)

died. In the serum period, 1894-1908, 1986 cases were treated, and of these 266 (13·39 per cent.) died: 507 cases were operated upon, with a fatality of 165 (32·54 per cent.), and of the remaining 1479 cases only 101 (6·82 per cent.) died.

Sterilisation of Catgut.

Bertarelli and Bocchia (*Zentralb. f. Bakt.*, i. Abt. Orig. Bd. l. H. 6, 1909) have carried out a series of experimental studies on the sterilisation of catgut. They group the known methods into (*A*) the Physical and Physico-Chemical, and (*B*) the Chemical Methods of Sterilising.

A. Of the numerous methods of sterilising with the aid of heat, they exclude all which necessitate an exposure to temperatures exceeding 120° C., because above this limit the special qualities of catgut, on which its usefulness as a ligature depends, are not completely conserved. Of the methods remaining, they chose three for the purposes of investigation—(1) heating in the dry state to 120° C. for two hours or more, without other treatment; (2) treatment with alcohol at 120° C. in the autoclave, following Grimbert's method, as adopted in the new French Pharmacopœia; (3) the method of Frederich—treatment with 5 per cent. formol solution for one to five hours, according to the thickness of the catgut, washing with water, and subsequent boiling in water for one quarter of an hour. Portions of catgut before being tested were infected with (*a*) sporing anthrax bacilli; (*b*) thirty-six hours' growth of staphylococci; (*c*) spores of B. subtilis; and (*d*) a sporing tetanus culture. The result of the investigation was that only by the second of these methods—Grimbert's—was the catgut rendered safely and completely sterile. Incidentally it was found that the spores of B. subtilis and B. tetani were much more resistant than those of the anthrax bacillus.

B. *Chemical Sterilisation Methods.*—The methods tested were those of (1) Claudius—treatment with 1 per cent. solution of iodine for eight days; (2) Lister—sublimate chromic acid method (*Sem. Méd.*, i. v., 1908); (3) Stich—treatment with 1 per cent. solution of silver nitrate in ammoniacal alcohol (*Zentralb. f. Chirurg.*, Bd. xxvi. 1906); (4) Mindes—two days' exposure to 1 per cent. solution of iodine in benzine (*Zentralb. f. Chirurg.*, Bd. li. 1906); (5) van Ketel—exposure for two days to a solution of sodium bromide and sodium chromate, then addition of ammonium bisulphate, which sets free the bromine, which is then allowed to act for two days longer; (6) Chlumsky—two to three hours' treatment in a mixture of pure camphor, 60 grms., pure phenol, 30 grms., alcohol 5 grms., washing with sterile water before using (*Deut. med. Wochenschr.*, 1908, No. 15); (7) Rognone—a modified Claudius method. Of these, the methods of Claudius, Lister, van Ketel, and Rognone were completely successful in sterilising the

infected catgut. In addition to being sterile, however, the catgut must retain its strength, pliability, softness and elasticity, hence the authors further tested the sterilised catgut with a dynamometer. Their final conclusion was that the Claudius method best fulfilled the requirements, followed closely by Grimbert's method and those of Lister and van Ketel. The last two methods caused some swelling of the catgut.

Osteomalacia and Rickets.

A great deal of interest has been taken recently in investigations as to the etiology of rickets, and also in the relationship of rickets to osteomalacia. Bossi (*Arch. f. Gynaek.*, Bd. lxxxiii. 3, 1907) found that cases, particularly acute cases, of osteomalacia recovered under the administration of 1 in 1000 adrenalin solution. Proceeding to investigate the subject experimentally, he discovered that when the suprarenal is removed in sheep, the clinical appearances of osteomalacia —phosphaturia and osteoporosis—quickly develop, the osteoporosis being more extreme on the side on which the suprarenal was removed. He concluded that the osteoporosis of osteomalacia has its origin in a diminished function of the suprarenals, and suggests that adrenalin is indicated in the treatment of rickets. Stoelzner (*Med. Klin.*, 18-22, 1908) found that in cases of rickets the suprarenals were not up to the standard weight; further, that they were poor in suprarenin, and contained too little chromatin substance. He concluded that in rickets the suprarenin-forming function of the suprarenals is insufficient.

Further research confirming and extending these observations will need to be carried out before much can be said with regard to this new theory.

Chorionepithelioma in the Male.

Additional cases have been reported in the last two years. Chuvin (*Med. Klin.*, 1908, xxxi. S. 1196) gives a case of a man, twenty years of age, who died in the Odessa Jewish Hospital from pulmonary tuberculosis. At the sectio a primary testicular tumour was discovered, with metastases in the lungs, right kidney, and retro-peritoneal glands. The microscopical picture was typical of chorionepithelioma. Orton (*Journ. of Med. Research*, 17th February 1907), at the sectio on a male, found in one testis a nodule one centimetre in diameter, which had the naked-eye appearance of chorionepithelioma, and microscopically, in addition to showing myxomatous tissue necroses and hæmorrhages, it contained two kinds of cells closely resembling Langhan's cells and syncytium.

Hirschsprung's Disease.

Petrivalsky (*Arch. f. klin. Chirurg.*, Bd. lxxxvi. 1908) describes a case occurring in a five-year-old boy. The principal pathological change discovered was a hypoplasia of elastic tissue in the wall of the whole alimentary canal, including the stomach, and in the walls of the vessels of the intestine, mesentery, liver and spleen. The interstitial connective tissue was also increased. The whole intestinal tract was about half the length it should have been, and the sigmoid flexure, in comparison with the rest of the large intestine, was not markedly elongated. Petrivalsky regards the disease as depending upon a hypoplasia of elastic tissue occurring primarily in the mesenteric vessels, and giving rise, in the first place, to irregularity in the vascular supply of the intestine, thus interfering with peristalsis. Following upon collection of fæces, the intestine dilates, and, subsequently, hypertrophy of the muscular coats of its wall takes place.

Tubercle Bacilli in Cream and Butter.

While everyone recognises that it is important to examine the sediment of milk for the presence of tubercle bacilli, one does not always realise the proportion of these bacilli, which, when present in milk, may be carried upwards in the cream, and in this way be transferred to the butter manufactured from it. Herr and Beninde concluded that while skimmed milk, buttermilk, cream, butter, and the sediment from infected milk all contained tubercle bacilli, the most seriously infected of these were the sediment and the butter. They found that out of 444 samples of butter, tested by themselves and others, 60 (13·5 per cent.) contained tubercle bacilli. Schroeder and Cotton, in their Report to the United States Department of Agriculture, 1908, refer also to a table given by Cornet, who found that out of 775 samples of butter, 101 (17·9 per cent.) were found to contain tubercle bacilli. They also refer to the statement of Broërs, that 10 per cent. of milk samples in the Netherlands are infected with tubercle bacilli. Schroeder and Cotton go so far as to suggest that these figures justify the conclusion that tubercle bacilli can be found more frequently in butter than in milk. Whether that be actually so or not requires further proof, but one should certainly realise that when butter is prepared from infected cream, tubercle bacilli must be present in greater concentration than in the milk from which the cream was derived, hence "measure for measure infected butter is a greater tuberculous danger than infected milk." The amount of salt in ordinary salted butter has practically no antiseptic power. After 99 days tubercle bacilli have been found to show only a doubtful reduction of their virulence. It is well known that the action of sunlight and drying are very important measures for the destruction

of tubercle bacilli, but from both of these agencies any bacilli present in butter are protected. Granting, then, that cream from the milk of tuberculous cattle is distinctly dangerous, and that bovine bacilli can certainly infect man, the danger is a real one. Herr, in a series of papers, one of which has already been referred to, in the *Zeitsch. f. Hygiene*, 1901, S. 153-200, discusses the whole question. He investigated the temperature necessary to destroy tubercle bacilli in cream. In four sets of experiments the lethal period at 65° C. was 10 to 15 minutes; at 70° C. the time was lessened to from 1 to 5 minutes; at 73-75° C. 5 minutes was necessary; at 80° C. 4 minutes' exposure was sufficient to kill all tubercle bacilli present. For details, one would refer the reader to the original papers. Herr concluded that pasteurising of cream is necessary to obviate the danger of tuberculous infection through butter; that exposure of cream to a temperature from 75° to 90° C. has no detrimental influence on the quality of the butter—it would even appear that the higher the temperature the better the quality of the butter; further, the "cooked" taste of the cream is not conveyed to the butter; exposure of cream for 5 seconds to 85° C. completely does away with the danger of tuberculous infection, *i.e.* exposure for 5 seconds *after* the cream has reached that temperature. In practice, however, Herr advises exposure of cream to 85° C. for 2 minutes. It would be interesting to learn that these observations of Herr have been confirmed.

Examination of Fluids, Sputum, &c., for Tubercle Bacilli.

Seemann (*Berl. klin. Wochenschr.*, 1909, xiv.) has made use of Uhlenhuth's antiformin (a mixture of Eau de Javelle and caustic soda), which quickly dissolves up all organic material, with the exception of tubercle bacilli. A 15 per cent. solution of antiformin is used. In examining sputum, 15 to 20 times its volume of the diluted antiformin is added. This brings about complete solution in 10 to 15 minutes, and then sedimentation is allowed to take place. The sediment is mixed with a little fresh sputum or egg albumin to make it adhere to the slide, and stained in the usual way. Seemann employed this method successfully for detecting tubercle bacilli in pus, urine, all kinds of sediments, fæces, blood and portions of organs, even though the last had been fixed in formalin. He also found it possible to use sediments from recent tuberculous material for cultivation and for inoculation, as exposure to the dilute antiformin for one hour does not kill the tubercle bacilli.

THERAPEUTICS.

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The Value of Fresh Serum in Hæmophilia.

It has been known for some time that, in certain types of hæmophilia, the addition of a few drops of fresh serum to the drawn hæmophilic blood markedly shortens the coagulating time. Weil suggested, therefore, the intravenous injection of fresh serum in cases of hæmophilia, and claimed that by so doing he was able to cause the hæmophilic blood to clot in approximately normal time. The doses he advocated were 15 c.c. intravenously or 30 c.c. subcutaneously of fresh serum. Owing to the elasticity of the venous wall the insertion of the needle gives rise to no after-hæmorrhage.

Baum[1] has recently had an opportunity of testing this treatment in three cases of hæmophilia. He had previously studied the effect of healthy serum on the clotting of the blood of animals rendered temporarily hæmophilic by intravenous injections of hirudin. He found that in mild degrees of hirudin hæmophilia the addition of a small quantity of fresh serum to drawn blood markedly reduced the clotting time, and a similar effect was obtained with intravenous injection of the fresh serum. This action was readily demonstrated when the hirudin caused the clotting to be delayed for several hours *in vitro*. But if the hirudin was pushed, so that the blood did not clot under twenty-four hours, the serum had no effect, whether it was added to the drawn blood or injected intravenously. In neither form of hirudin hæmophilia was the local application of fresh serum of any effect in checking bleeding from incisions or parenchymatous oozing.

In the cases of human hæmophilia the effect of serum was very doubtful. In the first instance, in the case of a medical student of 20, who had been slightly hæmophilic from infancy, the blood clotted in from 25-30 minutes. The addition of a few drops of serum caused the blood to clot in 5 minutes in a test-tube. A similar but less marked action was obtained with the injection of serum. Thus, before the injection of 20 c.cm. of fresh rabbit serum the clotting time was 21 minutes, while 30 hours after the injection it was 9 minutes. The effect did not last long, as 15 days later the blood again took 30 minutes to clot.

The other two cases were severe types of hæmophilia occurring in two brothers. The serum treatment was of no avail. In one case the blood clotted in from 1¾ to 2½ hours. The addition of a few drops of

serum reduced this markedly, but no effect was obtained with the intravenous injection of the same serum, though, *in vitro*, it had shortened the clotting time from 2 hours to 27 minutes. The serum treatment had also no prophylactic effect in this case, as a small incision to expose a vein bled for several days despite the serum injection 50 hours beforehand. The other brother gave exactly similar results, and in this case, too, the serum was very effective *in vitro*, but an intravenous injection neither shortened the clotting time nor prevented subsequent hæmorrhage, nor checked it when applied locally to the bleeding spot. Though his own experiences were of this discouraging nature, Baum suggests that possibly the serum may be of use in sporadic cases of temporary hæmophilia.

Treatment of Metabolic Osteoarthritis.

Nathan[2] prefers this term to the more common ones of arthritis nodosa or deformans. He understands by it a symmetrical polyarthritis spreading from the periphery, and of insidious onset, and differentiates it sharply from the various forms of infectious polyarthritis. In metabolic arthritis he finds local osteoporosis, and subsequently gradual degeneration of the joint structures without any evidence of inflammation. According to him the joint trouble is not primary, but is associated with a general disturbance of the general nutrition. Treatment of all kinds is so rarely of value in this disease that it is quite refreshing to hear an authority of such standing as Nathan report favourably of the effect of thymus gland. He has found it very successful in the case of children with Still's disease when the glands and spleen are enlarged in addition to the swollen joints. In this type of case the joints improve without any change in the glands or spleen. In adults the thymus gland treatment produces a marked effect on the general nutrition; the patients put on weight and increase in muscular power. The earlier the case is seen the better the result, as old cases require prolonged treatment with large doses. It is of course hopeless to attempt the restoration of joints which have been thoroughly destroyed, but the improved health is of distinct benefit. He advises 2 five-grain tablets thrice daily for two weeks; when 3 tablets thrice daily may be given, and after a few months this may be raised to 3 tablets four times daily. He keeps the patient at rest till all acute joint lesions have passed off, when passive movement may be begun and gradually increased till the shortened tendons prevent further advance along this line. He does not advise massage to relieve the shortened tendons; it is better to do tenotomy than to use force to stretch the tendons, as this is apt to cause fracture of the rarefied bone. After the contracted tendons are cut, and the deformity is corrected, the joints may be put up in light plaster splints for 3 or 4 weeks. By this treatment he obtains definite improvement in all but the most

severe cases. Thymus gland is not a specific, but merely a stimulant to the nutritive processes, and probably in a measure counteracts the deleterious influence of the causative condition.

Atoxyl.

Atoxyl is so much used for trypanosum diseases and for the treatment of syphilis that a pure preparation is desirable. Nierenstein[3] points out that atoxyl varies in regard to the water of crystallisation and adhering moisture. To ensure a constant strength he advises that it should be kept in the dark over sulphuric acid for at least five weeks, when it ceases to lose weight and contains two molecules of water of crystallisation with the formula $NH_2C_6H_4ASO\begin{matrix}OH\\ONa\end{matrix} + 2\,H_2O = 23{\cdot}88\ \%$ AS. Atoxyl should be a white crystalline powder. A white powdered form was found to contain free inorganic arsenic (from 0·4 to 0·9 %), which could be easily detected by passing H_2S into the slightly acid solution. Another impure sample was contaminated with the by-product parafuchsin. A sample of yellow atoxyl used in Uganda caused violent poisoning and blindness. In contained, in addition to free inorganic arsenic, pure free aniline, and probably an unknown oxidation product of atoxyl. This sample dissolved in strong (40 %) NaOH with a yellow colour. To obviate any similar unpleasantness, he suggests that atoxyl should be tested before use as follows:—1 c.c. of a 5 % solution should be mixed with 2 c.c. of strong alkali and allowed to stand for a few minutes. If at the end of this time it turns yellow, it should not be used. After injection atoxyl is excreted chiefly (80 %) in the urine, only 4 % appearing in the fæces. When an inorganic preparation of arsenic, as sod. arsenate, is administered, arsenic is present only in the hæmoglobin, but is not demonstrable in the blood serum or stroma of the corpuscles. With atoxyl and similar preparations, the amido group combines with the serum proteins, and consequently the serum, stroma and hæmoglobin all contain arsenic, and it is found in every structure of the body.

Oral Administration of Antitoxin.

M'Clintock and King[4] have pursued their investigations into the fate of antitoxin and toxin administered by the mouth. They find that, unless special precautions are taken to protect them from the action of the gastric digestive juice, they are rendered inert, and their therapeutic and immunising power is uncertain and cannot be relied on. If digestion is inhibited by appropriate drugs, toxin and antitoxin are absorbed unchanged and apparently in sufficient quantity to warrant the use of this method for therapeutic

and immunising purposes. In treating children with antitoxin by the mouth the following method has given uniform and satisfactory results. One half-hour before administration of the serum the child is given a glass of 1 per cent. sod. bicarb. solution. When the antitoxin is given there is added to it 1 minim of a fluid extract of opium (4 times the strength of the U.S.P. preparation) and 4-10 minims of a saturated solution of salol in chloroform. If possible no food should be taken for 4 hours before administering the serum. In 19 children and hundreds of animals used in their experiments there was no evidence of serum sickness or anaphylaxis. In their opinion the oral administration of antitoxins is the preferable one for the prophylaxis of diphtheria and tetanus, because (*a*) the absence of danger and the ease of administration, (*b*) and the cost, owing to the possibility of using dried antitoxin, is much lessened. At present, until the curative value of the oral administration has been demonstrated clinically on a large enough scale, the hypodermic use of antitoxin is the only one which is to be recommended for curative purposes.

[1] *Mitteil aus d. Grenzgeb. d. Med. u. Chir.*, 1909, Bd. xx. H. 1.
[2] *Amer. Journ. Med. Sci.*, June 1909.
[3] *Annals of Trop. Med.*, Feb. 3, 1909.
[4] *Journ. Infect. Diseases*, Feb. 18, 1909.

NEW BOOKS AND NEW EDITIONS.

A System of Medicine. Edited by WILLIAM OSLER, M.D., and THOMAS M'CRAE, M.D. Volume V. Diseases of the Alimentary Tract. Pp. 903. The Oxford Medical Publications. London: Henry Frowde, and Hodder & Stoughton. 1909.

THE fifth volume of the *System of Medicine* deals with disease of the alimentary tract, and should gain recognition as the standard work of reference on the subject. In a volume of 900 pages of comparatively small type, diseases of the alimentary system have been treated very exhaustively. Throughout, the value of the text is enhanced by numerous references to the more important literature of the subject. What illustrations there are are well executed, and the index is most complete.

The contributors, with the exception of Dr. Rolleston, are drawn from Canada and the United States, and are all recognised authorities on the subjects which they discuss. Opening with an introductory section on the critical relations which may exist between disturbed physiological activity and structural changes as expressed by morbid processes, the volume proceeds to a detailed account of morbid processes from the mouth to the colon. Much interest attaches to the articles on diseases of the pancreas, by Dr. Opie, and diseases of the intestine, by Professor Stengel. Functional disorders of the stomach are well treated by Professor Friedenwald, organic diseases of the stomach by Dr. Martin, while diseases of the liver, gall-bladder and biliary ducts is from the pen of Professor Kelly.

It would be idle to attempt a detailed criticism of such a work. Throughout it is on a high standard, and the editors are to be congratulated on the production of a volume which should certainly take a leading place as a standard work of reference on disorders of the alimentary tract.

The Body at Work. By ALEX. HILL, M.A., M.D., F.R.C.S., sometime Master of Downing College, Cambridge. Pp. 448. London: Edward Arnold. 1908. Price 16s.

THIS book is very well described by its title. It is not a text-book of physiology in the ordinary sense, but is an account of the vital processes which are at work in the various organs and tissues of the body. The author aims at "treating with some thoroughness the more recondite and the more suggestive results of recent research, and tries to indicate the trend of modern thought regarding problems as yet

unsolved." In the fulfilment of this task, let us say at once, the author seems to us to have succeeded admirably. Dr. Hill is a master in the art of exposition, and we hope that his assertion that he writes particularly for the amateur, and that he is concerned with the intrinsic interests of the science, apart altogether from its medical applications, will not lead the medical reader to imagine that the book is of no interest to him. This review is not likely to be seen by many except medical readers, and to such readers, at any rate to such as are not professional physiologists, we cordially recommend Dr Hill's book.

A long chapter upon the fluids of the body gives a vivid picture of the part played by the lymph in the economy of the body. A chapter on the internal secretions summarises the results of recent research upon the ductless glands. The chapter dealing with digestion is of particular interest, and will furnish enlightenment to anyone who is ignorant of the part played by "hormones" in the production of the digestive juices, or of the latest views as to the *rôle* of the intestinal bacteria. The chapter on the nervous system gives an excellent account of the neurone theory, of the structure of nerve-cells, of the peri-cellular networks, and of the course of the nerve-fibres, and of recent researches on cerebral localisation. Perhaps the author is at his best in his discussion of the higher functions of the brain, but we could wish that this section had been a good deal longer. We need not further particularise the contents of the various chapters, but we think that, in concluding, we should give a word of praise to the illustrations. These are indeed comparatively few in number—forty-six—and are, for the most part, simply outline sketches, but they seem to us particularly clear and admirably adapted to elucidate the text.

Physiology and Pathology of the Urine, with Methods for its Examination. By J. Dixon Mann, M.D., F.R.C.P. With Illustrations. Second Edition, Revised and Enlarged. Pp. 324. London: Charles Griffin & Co. 1908. Price 10s. 6d.

Within the four years that have elapsed since the first edition of this manual appeared, numerous advances have been made in biological chemistry, and the currently accepted views upon many subjects as to the pathology of the urinary secretion have been considerably modified.

Accordingly, many changes and additions have been incorporated in the second edition. Among the subjects into which recent investigations have been chiefly introduced may be mentioned glycosuria, with the allied subject of the presence of oxybutyric acid and its derivatives; also the questions affecting uric acid and Bruce Jones protein.

The last forty pages of the book, dealing with the pathological conditions that cause changes in the urine, are brought thoroughly up to date and form an admirable summary of the subject of metabolism as it concerns this excretion.

As in the first edition, the references to original papers are given at the foot of each page, so that the book forms an excellent starting-point for anyone desirous of examining the bibliography upon various conditions.

The essentially practical scope of the book has been well kept in view, and it still forms an admirable manual for the clinician anxious to extend his observations by the help of laboratory methods.

A History of the Reading Pathological Society. By JAMIESON B. HURRY, M.A., M.D., President of the Society. Pp. 179. With Illustrations. London: John Bale, Sons & Danielsson, Ltd. 1909. Price 7s. 6d. nett.

THIS volume contains a "brief historical *résumé*" of the Reading Pathological Society—a society founded on 13th July 1841, and during its long existence has taken a distinguished place among the medical societies of this country. The book contains an interesting description of many of the distinguished men who have been connected with the Society. It enumerates many of the important papers read before the Society, and also many of the cases and specimens exhibited at their meetings. Some of the specimens were of great variety, such as a "monstrosity with one head, four arms, and four legs," and a "double-headed infant." At another meeting a "calculus was exhibited which had been removed from the tonsil by incision. The incision caused the patient to cough with such violence that the calculus cracked the window-pane with which it came into contact." On another occasion were exhibited "three entire tape-worms and one lumbricus found at an autopsy." Among clinical cases described was a "hermaphrodite who supposed herself pregnant."

At one of the early meetings of the Society a member narrated a novel treatment adopted at Vienna for "an infant archduke, whom nothing would warm. The doctor got a sow into the room, killed her, opened the carcass, took out the bowels, and sewed the archduke up in the carcass. The treatment was triumphant!"

The volume contains much interesting reading, and shows that the Reading Pathological Society has done much excellent work. It is a beautiful volume, and the Society is under a deep debt of gratitude to its President for the way in which he has executed the work.

Practical Bacteriology, Blood Work and Animal Parasitology, including Bacteriological Keys, Zoological Tables and Explanatory Clinical Notes. By E. R. Stitt, A.B., Ph.G., M.D., Surgeon U.S. Navy, Graduate London School of Tropical Medicine, Instructor in Bacteriology and Tropical Medicine, U.S. Naval School, &c. First Edition. Pp. 294. With 86 Illustrations. London: H. K. Lewis. 1909. Price 6s. 6d. nett.

This book is not a formal treatise, but is rather a set of elaborate and accurate notes on the subjects specified in the title, prepared more immediately for those entering the U.S. Naval Medical Service. The author shows a practical acquaintance with the subjects and with the teaching of them, which is very refreshing. The book contains sections on animal parasites and biting insects, which are concise, clear, and greatly enhance its value. We would very cordially recommend this book to those going in for the various diplomas and certificates in tropical medicine, to those entering the Services, and to those intending to work in the Tropics.

Differential Diagnosis of Bacteria. By E. P. Minett, M.D., D.P.H., M.R.C.S., L.R.C.P., F.C.S., Assistant Bacteriologist and Demonstrator in Bacteriology and Microscopical Pathology to Guy's Hospital. First Edition. Pp. 72. London: Baillière, Tindall & Cox. 1909. Price 2s. 6d. nett.

With the bacteriological facts in this book, so far as they go, with few exceptions we find no fault. But we are entirely at a loss to see how any end is served by its publication. There is great danger that such works might convert a deferential harmless medical practitioner into an ignorant assertive pedant. For students the book is worse than useless. The order of treating the subject is bad; important points are mentioned in an aside: as for difficulties, there appear to be none, and bacteriology seems to be as easy as potato-planting. We do not see our way to recommend this book.

Practical Physiological Chemistry. By Philip B. Hawk, M.S., Ph.D., Professor of Physiological Chemistry in the University of Illinois. Second Edition. Revised and Enlarged. London: J. & A. Churchill. 1909. Price 16s. nett.

Although this book is designed for use in courses dealing with the subject of *practical physiological chemistry*, it includes so much theoretical matter as to render it rather unsuitable as a students' text-book in practical classes.

The author has taken great pains to render his work not only reliable, but as far as possible complete, and the second edition has been brought well up to date. Quite naturally those methods which have been introduced by American chemists are more frequently referred to than in similar English text-books. Among so much that is excellent, one may be pardoned for drawing attention to the plates of absorption spectra which might with advantage be improved in a later edition. These plates are by no means good, the absorption-bands in nearly all cases being unnecessarily indefinite. Thus, for example, the spectra of alkali hæmatin, carboxyhæmoglobin, acid hæmatin in ethereal solution, alkaline hæmatoporphyrin, and urobilin are so ill-defined as to be of very little value for purposes of comparison with solutions of these pigments. Many of the plates of crystals are of great value, notably the reproductions of Professor Reichert's microphotographs of oxyhæmoglobin crystals, and also of protein decomposition products, prepared according to Fischer's method by Dr. Osborne, of New Haven, Conn. It would be impossible in this short review to refer adequately to the numerous and in most cases extremely useful qualitative and quantitative methods described by the author. There is one most useful chapter on the Examination of the Fæces, a subject that is too frequently omitted in laboratory text-books of physiological and pathological chemistry. Six chapters are devoted to the Chemistry of the Urine, which therefore receives very adequate treatment. The quantitative methods employed at present in urinary analyses are described very fully and clearly. It might have been as well to omit certain methods which have been found to be inaccurate—for example, Heintz's method for estimation of uric acid, and Krüger and Schmidt's for purin bodies.

Folin's methods, or his modifications of the methods devised by others, are given more fully than in other similar text-books. Dr. Hawk's book will prove a most useful guide to workers in laboratories of bio-chemistry. Opinions naturally differ as to what constitutes the best type of laboratory guide. A book that is most valuable to the advanced worker in a laboratory may be quite unsuitable for the ordinary student, and this book appeals more to the former than to the latter.

An Introduction to the Science of Radio-Activity. By CHARLES W. RAFFETY. Pp. 201. With Illustrations. London: Longmans, Green & Co. 1909. Price 4s. 6d.

AT a time when the King, the laity and the medical profession are exhibiting a renewed interest in radium, the appearance of this book is very opportune. It is divided into three parts: the first part is descriptive, the second treats of the theories of radio-activity, and the third of

practical manipulations and experiments with radio-active bodies. Further, there is an excellent appendix which epitomises our knowledge of the subject. The author is not a medical man, and his book does not touch upon the therapeutic use of radium, but the physiological effect is briefly referred to on p. 13. The subject is approached from the physical aspect, but the treatment is popular, clear and lucid, and frequent references are made to Professor Rutherford's excellent treatise. The late Professor Becquerel's discovery of radio-activity is described, for this was the *fons et origo* of the search for radio-active bodies. Had not Professor Becquerel shown such acumen in rightly interpreting the results of his experiments, the Curies would in all probability have made no examination of pitchblende. Some pages are devoted to the electron theory of electricity and of matter. We were not aware that the X-rays had much effect in causing diamonds to fluoresce: radium rays set up a beautiful fluorescence, and diamonds can be distinguished from other gems in this way. With the X-rays the relative transparency is the best test. It would be well in a future edition to insert a list of the illustrations and to correct the printer's error at the foot of p. 99. Strutt's name is not mentioned in connection with the radium clock, nor is it stated that Madame Curie was a student in the late Professor Curie's laboratory, and that therefore she was working under his guidance and with his assistance. We can cordially recommend this book as an introduction to the subject of radio-activity.

High Frequency Currents. By H. Evelyn Crook. Second Edition. London: Baillière, Tindall & Cox. 1909. Price 7s. 6d. nett.

We have read with pleasure this edition which is brought more up to date. The more recent apparatus is well described, and particularly good are the records of experimental work. Much has still to be learned as to how these currents act, and the literature is so widespread that it is only in books like these that the average reader can overtake it.

Mr. Crooks, like most who specialise, is evidently an optimist, and some of the results are not produced in every case with the uniformity that he describes. Still, optimism is a desirable vice (*sic*), and, clothed in a nicely finished well-written work, it is still more meritorious.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES AND NEWS.

Medical Education. It is customary, in educational numbers, to say something about what lies in front of those who contemplate entering the profession of Medicine. As in the civilised world, as a whole, so in the profession of Medicine the pressure is ever increasing, and the student of to-day has to work much harder than his grandfather. The scope of medical knowledge is ever widening—indeed, of late years it has been expanding so fast that the licensing authorities have hardly had time to adapt themselves to the new conditions. Thus the average student is now unable to complete his course in the prescribed time as the great majority used to do, and though parents may be annoyed, it is not really the student's fault. The Education Committee of the General Medical Council has recorded its opinion that the time has not arrived for an extension of the five years' curriculum. That being so, it is obvious that the problem before the licensing bodies is to so apportion those five years that the fullest use may be made of them. This problem, which is occupying the minds of all concerned with the education of medical students, has been, during the past year, the subject of very thorough investigation by the Pathological Club of Edinburgh. The Club is primarily designed for the discussion of the latest original work, but all its members are, more or less, actively engaged in teaching, and the fact that its meetings are not public, and no records of its proceedings are published, seemed to mark it out as the most convenient place to thrash out the matter in detail.

Accordingly, after two meetings of the Club, at which the subject was discussed in its general bearings, a committee representative of chief subjects in the medical curriculum was appointed to consider the matter more closely. This committee held numerous meetings, invited to its conference men specially interested in the various branches, and drew up a draft report. This was very fully considered by the Club at three long meetings, and finally sanctioned in the form in which it appears on p. 293.

It will no doubt be read with interest, and as some critics think it too drastic, while others think it does not go nearly far enough, it

may be taken that the report is really practical politics. The essence of it is the insistence on a five years' curriculum : at present too many bodies permit (with the sanction of the General Medical Council) one of fifty-seven months—the compression of the earlier (scientific) part of the curriculum into the first two years, and the devotion of the greater part of the last three years to clinical instruction.

Nothing New.

THE following extracts from a lecture delivered by Graves of Dublin some time about 1825 will be read with interest along with the Report of the Pathological Club on Medical Education in 1909 :—"One of the most valuable things which the student can acquire, is *a habit of daily diligence*. . . . Can any thing be more embarrassing than the multitudinous array of studies presented to the young student who comes to London or Dublin with the view of educating himself as a general practitioner? . . . No profession requires a sounder preliminary education than ours, and in none ought education be more studiously directed to promote the activity and development of the mental powers, especially those connected with *the habit of observation* as well as with *the judgment and memory*. . . . I would not recommend any one to commence the actual study of medicine and surgery until the age of nineteen. Before that period the mind is not sufficiently ripe for practical observation, nor sufficiently stored with that knowledge—only to be gained by the daily intercourse of life—which teaches us to estimate the effects of moral or physical causes on the human system, imparts to us the power of weighing conflicting evidence, and detecting the too frequently incorrect and erroneous statements of our patients. . . . Five or six years' attendance on an hospital will be little enough to qualify you to enter with propriety and confidence on the discharge of your professional duties. Bear in mind, gentlemen, that when you come to treat disease, you approach the bedside as physicians or surgeons, and not as chemists, botanists, or anatomists. . . . Take, for instance, two of the most popular of the adjunct sciences—two usually regarded as most intimately connected with the study of medicine—botany and chemistry. Both are extremely valuable in themselves, and a certain acquaintance with them is undoubtedly desirable; but to the student in medicine their utility has been greatly overrated. Botany is an extremely interesting and useful science ; but I believe you might be very good practitioners without knowing the classes of Linnæus, or the families of Jussieu. To be sure, if you had the misfortune to practise in localities separated from the ordinary channels of commerce ; if you were suddenly bereft of the numerous stores which maritime enterprise pours into the lap of medicine, and obliged, like the herbalists of old, to search the woods and fields for your materia medica, you would certainly be often at a loss, and might make some serious mistakes,

unless you were adepts in practical botany. But this labour, fortunately for us and for every European practitioner, is quite unnecessary. A small capital will bring the vegetable productions of the most distant countries to your door; and any respectable druggist will for a trifling sum provide you with all the medicinal substances derived from plants, carefully selected, and accurately prepared. . . . I do not wish to undervalue botany as a part of general education. . . . But let botany be restricted within its proper limits; and when once young men have seriously engaged in the acquirement of medical and surgical knowledge, let them not entertain the ambition of becoming accomplished botanists. . . . I would not be understood here as wishing to depreciate any department of human knowledge. Far be it from me. Besides, the attempt would be useless. But I am anxious that you should concentrate all your energies on the proper objects of medical pursuit, and devote the largest share of your attention to those requirements which will render you good practitioners."

New Professors.

We have occasion this month to record no fewer than three professorial appointments in the Scottish Universities. Professor Robinson of Birmingham succeeds Cunningham in the Chair of Anatomy in Edinburgh. Professor Robinson is a graduate of Edinburgh, though most of his professional life has been spent south of the Tweed—in Manchester, London and Birmingham. He returns to his *alma mater* with a great reputation, not only as an anatomist but also as an organiser, thus maintaining the old traditions of this Chair.

The Chair of Anatomy in Glasgow has been filled by the appointment of Dr. T. H. Bryce. He, too, is an Edinburgh graduate who left Edinburgh soon after his graduation to settle in Glasgow. For many years he has taught anatomy in Queen Margaret (the women's) College in Glasgow, and he is now with general approval promoted to the University Chair. Dr. Bryce's embryological work has placed him in the very first rank of anatomists.

The contest for the Chair of Surgery in Aberdeen has been very keen, and there were abroad rumours of a very disquieting kind for the local candidates. Professor Marnoch, on whom Lord Pentland's choice ultimately fell, is a graduate in Arts and Medicine of Aberdeen, and has been Surgeon to the Aberdeen Royal Infirmary there for several years. A former assistant of Ogston's, and a popular teacher, his friends look to him to maintain the high traditions of the Chair of Surgery.

In commenting on these last two appointments, both the results of resignations, we cannot refrain from saying how undesirable it is that long intervals should occur between the resignation of a professor and the appointment of his successor. The likely candidates are all known

at once—all that it is necessary to know of them can be ascertained in a few weeks—and delays cause not only interruption to University work, but some inevitable friction among the friends and colleagues of he candidates, which could be very much minimised by a more prompt and business-like method of filling the vacancies.

The Principalship of Aberdeen is still vacant.

The Tutorial System.

CLOSER acquaintance with the inner workings of some other universities has led us to consider the question whether the Scottish Universities might not with advantage adopt something of the tutorial system in vogue in the great English Universities. That they should adopt it in its entirety is, of course, impossible—the systems are so different; but every teacher of experience must have come across students whose careers have been marred, and a few whose careers have been ruined, for the want of a guiding hand.

It is true that the Dean of the Faculty is always ready to help students who go to him for advice, but unfortunately the student too often seeks that advice too late.

Probably the time when a student most needs advice is when he has failed in his second professional examination. Some fail by accident and can easily recover the lost ground, but many are really not ready for the examination, and they toil through the rest of their curriculum overburdened with work, always attempting more than they can perform, and taking six, seven, or more years to qualify. It is just here that the advice of a tutor would be invaluable; he would know whether to advise the student to go on with the regular curriculum, or to take another three or six months in gathering sufficient knowledge to clear the examination hurdle. In the majority of cases we are convinced that the result would be to shorten the further period of study. There are other obvious advantages to be anticipated, but in the meantime we content ourselves with throwing out the suggestion.

THE EDINBURGH MEDICAL SCHOOL.

THE CURRICULUM AND THE GENERAL EFFICIENCY OF THE SCHOOL.

[A Report Submitted to and Approved by the Edinburgh Pathological Club, July 1909.]

A. MEDICAL CURRICULUM.

In dealing with the subject under consideration we have kept before us two leading principles, namely:—

(1.) That we were called on to deal not with the general question of Medical Education, but rather with the special requirements of the Edinburgh Medical School.

(2.) That in consequence of the practical co-ordination existing between the University of Edinburgh and the Extra-mural School, the object of our deliberations would be adequately attained by discussing the situation from the standpoint of the University.

In proceeding to define the problems which present themselves, we have first of all dealt with the question which appears to us the most important, namely—whether any modifications of the ordinary curriculum of the student of medicine should be suggested with a view to still further increasing its present efficiency.

We may first of all allude to certain general aspects of the situation which appear to us to be of great importance. These are as follows:—

(1.) While the Regulations of the General Medical Council impose five years of study, the last three months of the Edinburgh curriculum are at present so occupied by examinations as to be unavailable for useful work. We consider that it would be of advantage to the student of average ability if his course extended over five years and three months, and we are thus strongly of opinion that it should be made compulsory for the student to commence study in summer, and not in winter, as is the case with a majority of students at present. It may appear at first sight that difficulties stand in the way of what would in reality be a resuscitation of an almost uniform practice up till about fifteen years ago; but on consideration these difficulties largely disappear. Many students actually commence study in summer at present, and it is to be noted that effective school life is now practically concluded in the month of March. It is at this time that the

Board of Education Leaving Certificate Examinations are held, and if the results of these examinations were published before May, the student would find no difficulty in commencing his medical career in the summer session. From inquiries which we have made we are satisfied that in the cases of students from Australia, New Zealand, and the Cape, it would be as convenient for study to begin in summer as in winter.

(2.) Many of the difficulties which arise in arranging for the later subjects of the curriculum would disappear if the following of a fixed curriculum were insisted on. The taking of classes in unusual order ought in our opinion to be discouraged, and we shall have occasion to point out cases where the existence of an option as to the time of taking a class does not make for educational efficiency. The difficulty arising in a fixed curriculum of making provision for men who fail to pass a professional examination will be dealt with later.

(3.) Insistence on the following of a fixed curriculum is, we consider, not incompatible with a further extension of the present liberality of the University in recognising courses of study in other Universities as qualifying for entrance for the earlier professional examinations. We consider, however, that it would be to the advantage of the University to insist that the later subjects of the medical course should be studied in Edinburgh.

(4.) We consider that in all Medical Schools there is at present a dangerous tendency to treat each subject as if it were in a watertight compartment by itself. It is evident that of necessity there must be a certain amount of overlapping of the different subjects in Medicine, and much could be done by consultation between different departments to arrange for the distribution and co-ordination of teaching where such overlapping is bound to occur. It is, we think, advisable that such consultation should be voluntary rather than formal through a Board of Studies or other means. If co-operation could not be thus attained, it would be advisable for a syllabus of work in each subject to be laid down by some controlling Board.

(5.) We would recall that in the rearrangement of the five years' curriculum the idea in the minds of the clinicians was that the withdrawal of Surgery from the second year would enable the strictly scientific subjects to be overtaken in the first two years of the curriculum, and thus the last three years would be given over to the applied sciences and to clinical work.

(6.) It is perhaps unnecessary to point out that any changes such as we suggest in the regulations applying to students inside the University would also be applicable to University students attending qualifying classes in the Extra-mural School.

In now proceeding to detail the conclusions at which we have

arrived with regard to the curriculum, we may, first of all, state that, while in certain of the purely scientific subjects there appears to be a call for curtailment, in certain others an extension of teaching appears desirable.

1. Botany and Zoology.—We consider that the time has now come when it is not only desirable, but absolutely necessary, in the interests of the rest of the curriculum, to curtail the time spent on these subjects. It is now generally recognised that they have no longer any practical bearings on the succeeding parts of medical study, and any argument based on their educative value in introducing the student to the study of science is rendered invalid by the fact that in the present curriculum, as followed by the majority, the subjects are not taken up till the student has spent six months in the study of Chemistry, Physics, and Human Anatomy. A knowledge of the general laws relating to vital phenomena undoubtedly ought to be a feature of a University curriculum in Medicine, but it has been shown to be possible to communicate the essentials of such knowledge without insistence on details; and we consider that a course of Biology of fifty lectures, with fifty hours of practical work, is adequate to the necessities of the case. We trust that the University will see its way in the near future to constitute such a course of General Biology, in place of the present courses in Botany and Zoology. If the difficulties in the way of the adoption of this ideal appear insuperable, we hope that it may adopt the plan, which is being tried elsewhere, of providing a combined course in the two subjects occupying the time indicated.

2. Physics.—For two reasons we consider that the study of this subject should be extended, by the addition of practical work to the present theoretical course—

(*a*) There is no better training in exactitude of observation than practical work in this subject.

(*b*) In his later work in Physiology and also in Clinical Medicine, it is necessary for the student to be able to set up various physical apparatus, and he ought to be made familiar with this technique early in his course.

3. Chemistry.—The requirements of the student in regard to this subject may be arranged under three heads:—

(*a*) Instruction in the general principles of Chemical Science, which the student of medicine might share with the sstudent of other branches of science.

(*b*) Instruction in descriptive Inorganic Chemistry, so far as it concerns the later subjects of the curriculum, especially Materia Medica.

(*c*) Instruction in Organic Chemistry, especially in relation to Physiology, Materia Medica, and Clinical Medicine.

With regard to the last aspect of the subject, we consider that an extension of teaching, both theoretical and practical, is desirable; and we further think that the arrangement of the details of such teaching constitutes a case for co-operation between the departments of Chemistry, Physiology, and Materia Medica. We anticipate that the results of such co-operation would be a change in the present arrangements for the subject of Practical Materia Medica. Pharmacognosy would be provided for by the physical and sensible characters and reactions of the inorganic substances used in medicine being treated of in the course of Descriptive Chemistry. The time now allocated to Practical Materia Medica would then be available for a course dealing with the principles of Organic Chemistry, the characters of the principal organic substances used in medicine, and a description of the preparation and reactions of typical members of the group, *e.g.* the principal alkaloids. This course would be partly practical, and, as a whole, would be a preparation for the study of Physiological Chemistry and of Pharmacology. It is a question whether Organic Chemistry for medical students would be best taught by a pure chemist or by a physiological chemist. Much can be said for this subject being left to the latter. The modern teacher of Physiological Chemistry usually possesses a thorough grounding in Pure Chemistry, and he is in an advantageous position for appreciating the special requirements of the student of medicine. With regard to the teaching of Dispensing, which forms part of the work of the practical Materia Medica class, we feel that this would with advantage come later in the course. So far as the time to be occupied upon it is concerned, it might rank in this respect with Vaccination, and might be taught in small practical classes in the Dispensaries.

4. Anatomy.—With regard to this subject we have little to say. We, however, believe that it would be of great advantage if the examination could take place before the commencement of the new subjects, on the study of which the student must enter in the present third winter session (Surgery and Pathology). We shall try to show in a scheme of study that if the curriculum were to commence in summer, and if the courses in the preliminary subjects were re-arranged in the manner suggested above, the time available for the teaching of Anatomy would be the same as at present, and it would be practicable to hold the examination in July instead of in December.

As a matter of detail we believe it would be an advantage if dissecting work were to a certain extent treated like other practical

classes, so that a student assigned a part would be expected to engage in its dissection during certain fixed hours each day.

5. Physiology.—With regard to Physiology, we have been materially aided by the expression of views on its teaching advanced by leading physiologists at the Sheffield meeting of the British Medical Association held in July 1908 (see *British Medical Journal*, 1908, vol. ii. p. 374). On that occasion Professor Starling, in dealing with the necessity for putting a limit on the amount of knowledge of science to be required of the student of medicine, spoke as follows:—"I come finally to my own subject, namely—Physiology. It may be asked, 'Are you prepared to cut down the instruction in this subject as you have suggested in the case of the subjects of Biology and Anatomy?' This question is easily answered if we keep in mind the principles underlying our suggested reorganisation—namely, that knowledge should be imparted in direct proportion as it bears on the treatment of disease in man. From this point of view I cannot promise an actual limitation of the subject of Physiology. . . . This does not mean, however, that any and every fact in Physiology is to be taught to the medical student. I believe that Physiology even more than the other sciences which we have considered should be taught directly in its relation to medicine. Such a conception certainly involves the dethronement of the nerve-muscle preparation from the high place which it has occupied in Experimental Physiology, at any rate as taught in this country; but of subjects such as the heart and circulation, the secretion of urine, the processes of digestion, the nervous regulation of movement, the student needs to know more than we do ourselves. . . . When opportunity is available the student would learn much by a study of cases. The whole aim of the course should be by reference from man to animal and from animal to man, to give as real a knowledge as possible of the processes which in the wards he has to infer by the ordinary methods of clinical diagnosis."

We fully homologate these views, and especially agree with Professor Starling's differentiation between Physiology as a branch of pure science and as a subject of medical education. We therefore believe the scheduled time given to Physiology in the University of Edinburgh to be adequate. We think, however, that more time might with advantage be given to Physiological Chemistry. As the tendency in the department has been to take free advantage of the terminal system recently introduced into the curriculum, we consider that a rearrangement of the different aspects of the teaching along such lines would enable provision to be made for a fuller chemical course.

In the course of our inquiries an important matter relating to the practical teaching in the subjects of Chemistry, Anatomy, and

Physiology has been brought home to us. It is no doubt of value that practical work should be taught in small classes, but in a great school like that of Edinburgh this entails the division of the total number of men taking a class into sections often meeting at the same hour on different days of the week. Thus no combined meeting of the men of the year can be arranged to take place at that hour for work in another subject, and difficulties may arise in dovetailing the work of the departments. Amongst the teachers, however, the opinion is held that the value of small classes may be over-estimated, and that with care in organisation a member of a large class may be as adequately taught as a member of a small class. The difficulty of arranging for such large classes in Edinburgh lies in the fact that the class-room accommodation for practical work is often small. In the subjects we have named this is acutely felt, especially in Chemistry and Physiological Chemistry, and, in the former, not only is the present class-room for the practical work too small to accommodate the students requiring tuition, but it is unsuitable for the practical work in Organic Chemistry, for which we consider provision ought to be made. We understand that a similar deficiency of accommodation is felt to exist in the department of Anatomy. Here small tutorial classes are a necessity, but if more small rooms were available, different sections taught by different teachers could be held at the same hour, and the general arrangements for teaching would be much facilitated.

6. Materia Medica.—We are of opinion that the two subjects of Pharmacology and Therapeutics are of such importance as to merit separate consideration. The student would best profit by instruction in the two branches at different parts of his course. On account of its intimate relationship to Physiology, the subject of Pharmacology would be best studied soon after the examination in Anatomy and Physiology had been passed, and seeing that the methods of investigation pursued are those of Chemistry and Physiology, a course of fifty lectures and lecture demonstrations seems sufficient to cover the ground. We have already spoken of the advisability of there being practical co-operation between the teachers of Chemistry, Physiology, and Materia Medica, in the arrangement of the practical work, and if this were realised the necessity for a separate practical course in Pharmacology would not arise. With regard to Therapeutics, we consider it a matter of great importance that the medical curriculum should contain a systematised consideration of the subject apart from the treatment it receives in clinical teaching. It is evident that the student can best profit by such a course when he has some knowledge of Practical Medicine, and we

therefore suggest that a course of fifty lectures should be given in the fourth winter.

7. Pathology.—We are of opinion that the modern development of this subject renders a modification of the teaching necessary. It is advisable that the systematic teaching of Surgery should be relieved of much of the Pathology which conventionally is still retained in the treatment of this essentially practical subject, and, on the other hand, it is advisable that Morbid Anatomy and Special Pathology should be kept before the student while he is engaged on Clinical Medicine. We therefore suggest that the student should in his third winter go through a course of fifty lectures in General Pathology, in which special prominence would be given to the bearing of the subject on the surgical work which he is that winter commencing. Concurrently with this course there should be a course of fifty meetings for Practical Pathology —the two courses being so arranged as to form a correlated whole. At a later period in his course the student should have a further course in Pathology, in which Regional Pathology and the Pathology of Function could be treated of. It would be essential that the aspects of Pathology to be dealt with in each of the two courses should be scheduled, as it would be necessary for two professional examinations to be held instead of one as at present. We also consider it most desirable that every student should have actual experience in the making of post-mortem examinations. Arrangements for giving such instruction in the post-mortem room could, we understand, be made. We consider it of great importance that the co-ordination existing between the University and the Royal Infirmary should be further developed, and that demonstration classes in Morbid Anatomy should be formally arranged for in the Pathological Department of the Infirmary.

We now pass to the consideration of the all-important practical subjects of the curriculum—Medicine, Surgery, and Midwifery, and the special branches of these subjects. The development of these last in modern times has, of course, now necessitated the teaching being placed in the hands of specialists.

While the reorganisation of the parts of the curriculum with which we have hitherto dealt does not present any very serious difficulties, we feel that such is not the case with the subjects now to be discussed. We feel that the future development of this school necessitates some modifications in the system of clinical teaching, and as the questions at issue are varied in character and complexity, we have been forced to take them up at length and with considerable elaboration of detail.

In Edinburgh the teaching of the three great subjects—Medicine, Surgery, and Midwifery—has long included a systematic treatment in lectures and clinical teaching at the bedside. Some difference of opinion exists as to the part which such systematic lectures should play in the modern curriculum, and we may here state our views on this question. With regard to the subjects of the medical curriculum as a whole there are several points to be considered:—

(1) There is the fact that some students derive more benefit from oral instruction than from the reading of text-books.

(2) In the case of the earlier subjects of the curriculum, when only a knowledge of a small part of a science is necessary, it is often difficult to recommend a text-book which will exactly cover the aspect of the subject required.

(3) It is fitting that in a great University the individual views of the teachers (who cannot all be authors of text-books) should have the opportunity of finding expression.

(4) In every subject there are general aspects of questions which do not find a place in text-books.

(5) The constant progress of knowledge makes it necessary to present the most recent views on a subject.

These general considerations all have a bearing on the case of the practical as well as the scientific branches of Medicine, but there is a special reason for considering a systematic treatment of the former to be necessary. It is advisable that in an early stage of the study of Medicine and Surgery the student should be made to take a general view of the whole field to be traversed. A general view of this kind, it is true, might be got from a text-book, but, in the absence of authoritative tutorial supervision, the only means of ensuring for the student the educational advantage of this way of approaching a subject is to insist on his attendance on lectures at the appropriate period in his curriculum. We consider, however, that when this introduction to a subject has been given, the usefulness of the systematic lecture is largely at an end, and the future training of the student should be by clinical instruction, supplemented by work with a text-book. These are the principles which it will be found have guided us in the recommendations which follow.

The amount of practical work required of the student during the last three years of medical study is such that the dovetailing of subjects is a matter of great difficulty, and cases where clashing has occurred have been brought to our notice. Many

existing difficulties would disappear if a suggestion which we owe to Dr. Byrom Bramwell were adopted, namely, that so far as the practical subjects are concerned, Saturday morning should be made an integral part of the academic week. We can see little objection to the adoption of this course. From inquiries we have made, we do not find that either teachers or students would consider it to give rise to hardship, and, as a matter of fact, Saturday up till 1 P.M. has been for many years informally devoted to work. We have, therefore, in several of our recommendations, gone on the supposition that this extra time can be made available.

Further, in all our dealings with the years of practical study, we have kept in view the principle that the student should be free for clinical work from 10 or 10.30 A.M. till 1 or 1.30 P.M.

We now proceed to consider the practical subjects seriatim, and we also append a time-table, showing in outline how our suggestions would work out in practice:—

8. Surgery. — (1) *Systematic Instruction.* — This, we consider, should consist of a junior course of fifty lectures on three days a week to be taken in the third winter and a senior course of the same extent to be taken in the fifth winter. In the former the student would study the general principles of surgery, the treatment of wounds and fractures and elementary surgical pathology, and in the latter the subjects of regional surgery and advanced surgical pathology would be taken up. For convenience of teaching, the junior course could meet on three days a week, and the senior on the other three. On the days on which no lecture was being delivered the hour would be available for tutorial work, and the staff of assistants in the department should be sufficiently large to ensure that the sectional classes shall be small.

(2) *Operative Surgery.*—This should be attended in the last summer of study.

(3) *Clinical Work.*—Here we have been guided by the following considerations:—

(*a*) We have in our review of the earlier part of the curriculum laid it down as of importance that the University should insist on a definite course of study being followed. In applying this principle to clinical work we submit that at the beginning of each academic year the precise course of clinical instruction which each student should pursue during its three terms should be laid down. We consider the cardinal necessity here to be that the

number of men working in a particular set of wards in the hospital should be rigorously limited, the utmost limit being, we should say, forty students to each Surgeon with two wards. It is only fair that the students should have a choice, and the first forty entering their names for any particular Surgeon should be assigned to that Surgeon, but any excess above that number ought to be distributed to other Surgeons. We consider that it is only by limitation along the lines we have suggested, that the highest efficiency of clinical teaching can be attained.

(*b*) We consider it to be of great importance that the services of the Assistant Surgeon should be taken advantage of for teaching purposes, either in the way of relieving the Surgeon of teaching on certain days of the week, or of taking half the clinique in one ward while the chief was taking the other half in the other ward, or of taking the junior clinique while the chief was taking the senior. We further consider that during the performance of those operations, which can only be properly appreciated by senior students, the services of the Assistant Surgeon should be taken advantage of for teaching the junior students elsewhere. In this way the office of Assistant Surgeon would be enhanced by his being officially recognised as a teacher, and the position of House Surgeon would be rendered more valuable by the holder assisting at operations in the absence of the Assistant Surgeon.

(*c*) The duties of the Clinical Tutor as at present exercised should be modified. It has been brought home to us that much of the present teaching of this official could be as well given in the Systematic Tutorial classes. We consider that the Clinical Tutor (1) should be responsible for seeing that the students in a ward take satisfactory records of the cases; and (2) should have the opportunity of giving elementary instruction in clinical diagnosis.

(*d*) We consider that work in the Out-patient Department of the Infirmary should be more formally recognised than it is at present, and that no student should receive a certificate of attendance on Clinical Surgery until he has completed a fixed term as an Out-patient Clerk or Dresser. The extent to which work here could be insisted on is determined by the size of the Out-patient Department, and while work for a full academic term would be advisable, probably at present attendance for only half a term would be practicable.

(*e*) It was formerly the custom for each Assistant Surgeon to give, on his waiting day, a clinique on the new out-patient cases. These cliniques were greatly appreciated by the students, and we believe that there are no great difficulties in the way of adding this feature to the present out-patient system.

(*f*) We are of opinion that the Surgeon should be responsible for recording the attendance and diligence of the students in his wards.

Taking these considerations into account, we think that the clinical instruction in Surgery should be arranged as follows:—(1) A period of nine months (the two winter terms of the third year, and the summer term of the fourth year). During this time, from 10.30 to 12, the student would work in the wards under the Clinical Tutor (taking cases, &c.) or Assistant Surgeon, and from 12 to 1.30 he would attend the cliniques of the chief or witness operations. During his period of attendance in the Out-patient Department, he would be engaged there from 10 to 12, and at 12 would go to the wards to which he was attached. It would be well for the student to be attached to one set of wards for the first two terms of his course, and to another set for the final term of the nine months' work. (2) In his fifth winter, on three days a week, the student would be a member of a senior clinique and attend operations. These cliniques, like the junior, would be limited as to numbers, and the members of a clinique would be attached to one Surgeon for at least one term.

9. Medicine. — Many of the remarks which have been made regarding Surgery apply also to Medicine. We consider it advisable for the student to have put before him a general view of the subject when he is commencing its study, and we consider that there should be retained as part of the teaching a course of systematic lectures which would meet the student's requirements in introducing him to the subject. The chief danger inherent in systematic lecture courses in Medicine we take to be their being turned into a substitute for text-book study. It is impossible to divide the subject into junior and senior courses as in the case of Surgery, and it is further very doubtful whether in the conventional number of one hundred lectures a full consideration of the subject should be attempted. We consider the ideal course in Systematic Medicine to be one of ninety or one hundred lectures, in which every system is treated of generally, and in which the consideration of such special departments of Medicine as are otherwise provided for is entirely omitted.

With regard to Clinical Medicine, we are of opinion that—

(*a*) The student's energies should be devoted to his ward work, and on his diligence in performing this his certificate of attendance should depend.

(*b*) Further, it is desirable that a correlation of the clinical teaching in Medicine should be carried out similar to that now obtaining in Surgery, all the Physicians being recognised as University lecturers and examiners.

(*c*) As in the case of Surgery, the number of students attending a Physician should be limited to, say, forty.

(*d*) The Assistant Physician should take a definite part in the teaching in the ward to which he is attached, and on his waiting day might conduct a clinique for senior students in the Out-patient Department.

(*e*) The Clinical Tutor's chief duties should be to superintend the taking of cases by the students and to take part in the elementary teaching.

(*f*) Either the Clinical Tutor or some other officer attached to each set of wards should be responsible for the side-room work of the ward. In this connection it has been pointed out to us that in most of the wards both the accommodation and the equipment are insufficient for this class of work. With regard to the former, we would point out that much improvement would result from a simple structural alteration in the arrangement of the rooms attached to each ward. At present the doctors' room, where this work is done, is too small, and on the other hand the kitchen is unnecessarily large. If the functions of these two rooms were interchanged, and if a bow window were built up to take the place of the present kitchen windows, a room suitable for teaching and for the necessary side-room work would be available. With regard to equipment, we think it can no longer be considered the duty of the Physician of a ward to provide at his own charges the instruments required for the adequate clinical investigation of the cases under his care. We consider that provision should be made for this out of the students' Infirmary fees. The importance of Clinical Pathology from the point of view of the patient, the student, and the Physician is coming to be more and more recognised, and we are convinced that a satisfactory solution of the difficulty can only be attained by increasing the accommodation for side-room work in connection with each set of wards.

Were some such scheme as we have indicated carried out, the year succeeding the first year of the study of Surgery would be available for the student receiving a very thorough grounding in Medicine, partly systematic, chiefly clinical—

(*a*) *Systematic.*—During the nine months devoted to this end, the student would on three days a week attend a general course of lectures on Medicine (ninety in all), which could be held at the same hour as the lectures in Surgery (thus conserving the hours which, as we have laid down, should be devoted to clinical work). These lectures would take place on the days given up to those on Junior Surgery.

(*b*) *Clinical Work.*—During the fourth winter and fifth summer

the student would have the hours from 10 or 10.30 till 1.30 free for ward work, the earlier hours being occupied by case taking, &c., under the guidance of the Clinical Tutor and the Resident Physician, and from 12 to 1.30 he would attend cliniques of the Physician or Assistant Physician. We consider that during this year there should be constant attendance at the post-mortem room, and that means ought to be taken for the findings of morbid anatomy being considered from the standpoint of Clinical Medicine.

Such being the arrangements for the first year of clinical work in Medicine, the student in his final year would be expected (again in limited cliniques and attached to wards) to attend senior cliniques between 12 and 1 on the days on which he was not occupied with the senior surgical cliniques.

As in the case of Surgery, it would be best for the student to attach himself to one Physician for the first two terms of his course, but in the third term, and also when taking out senior cliniques, he might be allowed to change the wards in which he worked, always provided that the principle of limited cliniques were rigorously maintained.

(*c*) *Dispensary Work.*—This aspect of a student's work in the Edinburgh Medical School must be looked on as not only one of its most unique but also one of its most valuable characteristics, a characteristic to the maintenance of which every effort ought to be devoted. Ample time can be found for this department of work in the final winter, as the time-table will show.

(*d*) *Medical Out-Patient Department of Infirmary.*—As we have said, we think attendance here is an important part of the student's training, as it brings him in contact with the methods of dealing with cases of a character somewhat different from those met with in dispensary practice. It is manifest that he is not in a position to most fully benefit from the work here till near the end of his course, and it is in the final year that we have placed his attendance.

10. Midwifery and Gynæcology.—These subjects have, like the others, to be considered in their theoretical and practical aspects—

(*a*) With regard to the former it appears that, especially in the case of Midwifery, the advantages of oral instruction as pursued in Edinburgh are very marked, seeing that in schools where such instruction does not obtain, the standard of attainment on the part of the student is much lower than here. We therefore see no reason for suggesting any alteration in the method of teaching, and we consider that the subject can be very adequately and thoroughly

covered in a course of one hundred lectures. There are strong reasons for these lectures being attended as early in the practical part of the curriculum as possible, as the General Medical Council stipulates that a course of instruction should be attended before a student is allowed to take out his practical work. It would therefore be well if the class were taken in the fourth winter.

(*b*) *Practical Midwifery.*—The providing of the statutory number of cases of labour to be attended by each student must always constitute a difficulty in a great Medical School, but we are led to understand that the steps already taken for co-operation between the various medical charities in the city of Edinburgh and the Maternity Hospital is likely to provide a mass of material the extent of which has hitherto perhaps not been sufficiently recognised.

From the evidence we have had before us, however, we are convinced of the soundness of the principle that every student during his practical training should be resident in a maternity hospital. It is important to train the student to deal with all types of cases practically, and as it is only in a maternity hospital that unusual cases are frequently met with, we hope that steps will be taken for the further development of the organisation at present existent in Edinburgh for the pursuit of this ideal.

(*c*) *Practical Gynæcology.*—With regard to this division of the subject, we are of opinion that the present teaching is adapted to the requirements of the ordinary student of Medicine. Under the scheme at present in operation each student receives one month's instruction in Clinical Gynæcology. During this period one-third of the time should be taken up with the methods of Gynæcological examination, one-third with practice in minor Gynæcological operations, and one-third in seeing major Gynæcological operations. The student should learn how to take cases under the direction of the Resident, but the present Gynæcological tutorial classes held in the Infirmary would more appropriately form part of the instruction in systematic Midwifery and Gynæcology.

11. Special Subjects.—We have here what may be termed—

(*a*) *Major Special Subjects.*—These are—(1) Diseases of Children; (2) Diseases of the Skin; (3) Diseases of the Eye; (4) Diseases of the Ear and Throat. Attendance on a course of instruction in Diseases of the Eye is at present compulsory; in our opinion all these special subjects should be placed on the same footing. We would again here advocate the view that the teacher should be assured of the diligence of the student before granting him his qualifying certificate.

It is with regard to these subjects that the advantages of the

six-day week are most apparent. The courses at present in most cases comprise three weekly meetings—one for lecture and two for clinical work—extending over one term. If the tuition went on during each term of the academic year, the classes would be quite small, and thus a high degree of efficiency would be attained ; and, if two subjects were arranged for three days of the week and two on the other three, a student would be able in two terms' work to get over the whole ground. The most suitable period in the curriculum would be the fifth summer and winter, and as there appears no difficulty in holding the classes comparatively early in the morning, attendance on senior medical and surgical cliniques would also be possible in accordance with the suggestions already made.

(*b*) *Minor Special Subjects.*—These are Mental Diseases, Venereal Diseases, Fevers, Vaccination, Surgical Anatomy, Dispensing, and the Writing of Prescriptions. With regard to Dispensing, in consequence of the suggestions we have made regarding Practical Materia Medica, special provision would require to be made. Appropriate tuition could be arranged, either in the Materia Medica Department in short courses of say a month's duration, or in the Dispensaries. An examination in the subject should be held every term, so that the student would readily have opportunity for qualifying. With regard to the other subjects specified, a glance at the time-table will show how the teaching could be made to fit in with the rest of the course. The most difficult case is that of Fevers, as the distance of the City Hospital from the centre of the city necessitates an hour being added to the time occupied in the clinique. We do not think, however, that much difficulty would be found in making suitable arrangements, and the only point we would make is that the Fever cliniques should at all times of the year be arranged to take place in daylight.

In view of the stress we have laid on the University prescribing a definite curriculum for the student, it is almost needless to add that power should be obtained to prevent a student taking out any special class till after he has passed his Third Professional examination (*vide infra*).

B. CONSIDERATION OF FURTHER QUESTIONS BEARING ON THE EFFICIENCY OF THE SCHOOL.

There still remains a number of matters which have arisen in the course of our deliberations.

I. Examinations.—During recent years there has been a tendency, not only in Edinburgh but elsewhere, to introduce the

principle of allowing a student to pass a subject of professional examination whenever by attendance on the prescribed courses he is qualified to do so. This movement is animated by the best intentions, and has as its aim the lightening of the student's work. The working of the plan has, in our opinion, not been attended with success, and has even had an effect opposite to what was desired. Instead of spreading the student's work more equally over the period of his curriculum, it places on him a constant incubus in the form of an imminent examination, on success in which his career at the University depends; and further, the educative value of periods of immunity from academic pressure is lost. It is manifestly impossible by any arrangement of a curriculum to ensure that one subject shall be finished before another is begun, hence, the constant effect is that the student being only human concentrates the whole of his efforts on an often unnecessary amount of preparation for the next subject of examination, meanwhile practically wholly neglecting the other subjects which he should be studying at the same time. We have convincing evidence from both teachers and students that this is what is actually happening in consequence of the splitting up of the Final Examination under the recent ordinance.

Generally speaking, we do not see much harm in the perpetuation of this system for the subjects of the First Professional Examination, but we consider that when the heavier subjects of the curriculum are approached, the grouping for examination purposes disturbs synchronous work for other subjects less and makes for the educative efficiency of the whole curriculum. We have already suggested that Anatomy and Physiology should be passed at the same time at the end of the third summer. We now suggest that a Third Professional Examination should be constituted, consisting of Pharmacology and Elementary Pathology, and should be passed at the end of the third winter; that a Fourth Professional Examination dealing with Medical Jurisprudence and Public Health should be passed at the end of the fifth summer, and that the Fifth and Final Professional Examination, including Medicine, Surgery, Midwifery and Gynæcology, Clinical Medicine, Clinical Surgery, Clinical Gynæcology, Advanced Pathology, and Therapeutics should take place in the sixth summer. Here we would add as a detail that we think the sixth summer term should commence in the middle of April, and the examinations should begin about the end of June. This Final is, no doubt, a heavy examination, but taking into consideration that the knowledge

gained in preparation for it is to be the capital which in practice the graduate must have constantly available, we do not think the effort too much to expect from one who aims at a qualification on a University standard, especially as we consider that the examinations should be largely conducted on very practical lines. We think that the work of the student will be really lightened when he has to take the Theoretical work for the final subjects along with the Clinical. The examination is also heavy from the point of view of the examiners, and we think that it would be to the general advantage if their numbers were increased.

In all the Professional Examinations, a candidate who fails ought to have an opportunity of making a second attempt three months after his rejection. If he fails a second time, then he must pay the penalty by his curriculum being lengthened. Practical experience in examining, we think, points to two rejections indicating a want of aptitude, studiousness, or ability which demands a more prolonged period of study than is necessary in the case of the average student.

The question arises whether in every case it should be insisted that a student shall have passed the First and Second Professional Examinations before he is allowed to take out classes preparatory for later examinations. We are of opinion that there is much to be said for such a block, seeing that the student who has the burden of preliminary examinations upon him is not in a fit position to profit by clinical work.

We have considered the question whether it would be possible that honours obtained in class examinations should allow exemption from a professional examination. This question is beset with many difficulties, the main one being that the University recognises so many qualifying courses of instruction, both in Edinburgh and elsewhere, that injustice would be done to extra-mural teachers if their pupils were not also placed in a similar privileged position. It would not be feasible to hold these examinations outside Edinburgh, and difficulties would arise in connection with the setting of the questions and the marking of the papers. The fairest way would be for both duties to be carried out by a board of the University and extra-mural teachers. If any scheme were found practicable, we consider that the attainment of a certain standard by a student should only exempt him from the written part of the corresponding Professional Examination. While agreeing with the principle that honours obtained in class examinations should be taken into account in estimating the attainments of a candidate

in a Professional Examination, we are not at present prepared to make any definite proposal.

II. The Question of Instituting an Honours Degree.—We have considered this matter with great care, and have formed the opinion that it is not desirable to advocate any change in the present arrangements so far as they concern the M.B. degree. The standard for this degree in Edinburgh is at present so high, that if any attempt were made to introduce a double standard of a Pass and an Honours Degree, the standard of the former would, we think, inevitably be lower than that which at present prevails, and this would be most undesirable. The institution of an Honours Degree relating to the whole curriculum would, we consider, be inadvisable, in consequence of the absence of any criteria by which a student coming to the University could judge himself or be judged by others as to his fitness for embarking on an honours curriculum. Further, the making of it possible for a student to take honours in any particular subject or group of subjects would necessitate the institution of honours courses of instruction in all subjects. This would necessitate a large increase in the University staff, and changes in the teaching arrangements such as put any scheme at present outside the range of practicability. We consider that the present system of giving honours in professional examinations has on the whole, and with very few exceptions, resulted in the best men coming to the front. The characteristic aim of the Scottish Universities has always been to give all students an equal chance, and we consider that the present system has fulfilled this purpose. The only modification which we would suggest is one which would meet the case of the student whose mental development is slow. Cases have occurred where a really brilliant man has been ultimately debarred from the highest honours in consequence of failure in any of the preliminary scientific subjects, and we suggest that failure in the subjects of the First Professional should not preclude a student from benefiting from honours obtained in the subsequent examinations.

Looking at the matter broadly, the institution of honours in certain subjects would predicate specialisation by the student in these subjects before his qualification was obtained, and, incidentally, would in any case make an additional year of study necessary. We think that many students would be tempted to this early specialisation, who on the one hand would not really benefit to any

great extent by the honours course, and who on the other hand might suffer by not paying sufficient attention to subjects other than those in which honours were sought. We think the case of the brilliant student who wishes to distinguish himself in any one department would be sufficiently provided for, not by altering the course of study for the M.B., but by elaborating the conditions under which the Doctor's Degree might be obtained. It would be easy to institute a degree with honours in any subject or group of subjects. Any course of study might be laid down which it seemed desirable to demand and practicable for the University to offer, and the standard of examination would naturally be made high. It would not, we think, be at all desirable to interfere with the present system of taking the Doctor's Degree by means of examination and theses, for the most distinguished of which gold medals are awarded. The taking of the M.D. by examination with honours would rather be an alternative method by which the higher degree could be obtained. In this way, without any interference with the present mechanism of the qualifying Bachelor's Degree, a student who had in his course for the latter proved himself to be a man of parts, would be able to satisfy his laudable ambition for special distinction in any department of the curriculum.

III. Post-Graduate Work.—While the primary and all-important aim of the University of Edinburgh must be the maintenance in the highest state of efficiency of the medical curriculum for the undergraduate student, the now growing demand for post-graduate instruction must also be kept in view. The setting up of courses of study for honours would necessarily from the circumstances of the University be gradual, and could be made to form part of this post-graduate instruction. At present it is probably enough to lay down the principle that the development of this department of work must be kept in view, and to emphasise the fact that, altogether apart from the utilisation of post-graduate study for the obtaining of higher honours, provision must be made for the wants of graduates and others coming to the Edinburgh School for the purposes of acquainting themselves with the latest developments of knowledge in the various departments of medicine.

IV. The Position of the Teaching Staff.—Many of the suggestions which we have made would undoubtedly throw additional duties on the teaching staff of the University, of such a kind as would necessitate an increase in its numbers. We may

point out that, even at present, the number of assistants in several of the departments is small as compared with that found in many of the newer schools of medicine. The result of this under-staffing is that the burden of teaching occupies the time of the teacher to such an extent as to prevent him doing the original work which is necessary for his own efficiency and advancement, and which it is essential should be done, if the University is not merely to live on its reputation. We consider that the criterion of whether a department is sufficiently or insufficiently provided with assistants is to be found in the answer to the question whether each assistant, after his routine duties are performed, has at least three hours a day free for original work. It is quite unfair, both to students and teachers, if the latter can only look to the leisure of the vacations to provide them with time for the research which is the essential feature of a living medical school.

We are fully aware of the difficulties of increasing the number of assistants in a great medical school like that of Edinburgh. Not only may it be difficult to obtain sufficient men, but their future position and prospects have to be considered, as it is manifest that only in very few cases can a subject offer a career to a man even of high ability. We think, however, that the present situation can be improved in two ways.

One of the unsatisfactory features in medical education everywhere at present is the growing tendency for a divorce to take place between the scientific and practical subjects. An outstanding exception is found in the case of Anatomy. Here it has always happened that men have occupied the junior positions in the department and have made contributions to anatomical knowledge who had no intention of pursuing the subject as a career, but who recognised proficiency in Anatomy as one of the essential qualifications for success in Surgery and also in Medicine. We consider that what thus happens points the way to one solution of the difficulties of the situation. In Physiology, Pathology, and Materia Medica, it would be well if amongst the assistants were found those who ultimately looked forward to the practice of Medicine, and also, in the case of the first two departments, to the practice of Surgery. Not only would the number of those available for assistants' posts be increased, but the fact that men intending to apply scientific knowledge and training to the practical side of the profession were working in a scientific department, would inevitably keep practical questions to the forefront in that department. Further, what is already known to every advanced clinician

would soon be recognised by those responsible for making clinical appointments, that there is no better preparation for the best work in practice than the training which a couple of years spent in strictly scientific pursuits affords.

In this connection we consider that steps should be taken for the alteration of certain of the regulations of the Royal Infirmary under which restrictions are placed on the holders of junior offices of the Infirmary staff, precluding them from holding other appointments.

There is another solution to the problem of the future of University assistants. We consider that the time has now come for the University to inaugurate a policy of adding to its senior teaching staff by the creation of extraordinary Professorships. In nearly every department the progress of specialisation is pressing on the authorities of all medical schools the necessity for making provision for subdividing teaching by placing aspects of a subject in the hands of specially qualified teachers. In Edinburgh within recent years this has been recognised in the creation of lectureships, but the time has come for positions of greater value and dignity being originated. If this were done, the drain of the younger talent from Edinburgh, which is not altogether desirable, would be checked.

V. Financial.—It is manifest that, for the carrying out of our suggestions, additions to the financial resources of the University would be necessary.

The most immediately pressing wants are those which concern the reorganisation of the clinical teaching, and the bringing of the Assistant Physicians and Surgeons, including those attached to the special departments, not only to share in the teaching, but also to share in the fees derived from clinical classes. While this reorganisation is the most urgent need from the standpoint of the efficiency of the School, it is that in which the financial position presents least difficulty, for there can be little doubt that the fees at present charged to students for clinical instruction are too low, no increase having been made, for instance, when nine months' attendance in Clinical Surgery was insisted on instead of six months. We consider that the clinical fees, both in Medicine and Surgery, should be £3, 3s. a term, with the granting of a perpetual ticket for £12, 12s. This, we reckon, would bring in a sum of about £5000 a year, from which fund the members of the senior and junior staffs, including the clinical tutors, of the Infirmary would be paid.

The increase of the University staff in the scientific subjects presents a financial problem of greater difficulty, as it seems inadvisable to raise the fees, except perhaps in Practical Anatomy, where the fee ought to be £4, 4s. for six months' work and £3, 3s. for three. Undoubtedly any developments here along the lines we have suggested would necessitate a financial scheme of considerable magnitude, and an increase in the capital of the University.

But the increase of the teaching staff is not the only want of the University. If we except the case of the Usher Institute, it is now over thirty years since any great additions have been made to the medical buildings, and in several of the departments the need of extension is a pressing one. A good deal has been done, and is being done, for the department of Physiology, but in the cases of Chemistry and Pathology especially, extensive changes appear to be necessary, and it is doubtful if in many of the other departments the accommodation for research on the part of the staff and of others is sufficient.

The University has already received much aid from the beneficent operations of the Carnegie Trust and other endowments, but it is evident that, unless in the immediate future these are supplemented, the University may find itself left behind the newer schools in the extent of its equipment. That the Executive Committee of the Carnegie Trust would welcome aid in its efforts, the following paragraph from the Seventh Annual Report (1909) shows:—

"In presenting this scheme of distribution, the Committee venture again to express the hope that their attempt to combine the relief of immediate necessities with the gradual increase of secured and permanent endowments will act as an incentive to stimulating local efforts to supplement the present contributions by the Trust, and thereby to hasten the completion of many of the important purposes to which the Trust is able to give but partial assistance. It cannot be too strongly impressed upon the public, that it is only by co-operation with other agencies that the Trust can attain a fair measure of success in meeting the constant advances in any one of the multifarious departments of modern science. Further, it is to be remembered that every accession to the educational resources of our Universities brings with it additional responsibilities and charges. Books require shelves, new chairs demand class-rooms, and, above all, new buildings and laboratories bring with them the burden of upkeep and equipment. Indeed, it might almost be said that the institution of the Trust has done as much to reveal the needs of our Universities as to supply them."

In view of these facts, we would put forward the suggestion that the time has now come for the needs of each department of medical learning to be considered with a view to a comprehensive scheme of development for the whole Medical School being put forth. In the preparation of such a scheme it would be natural that all the interests concerned should be in consultation, not only those of the University, but also those of the Extra-mural School, and of the Hospitals which form an integral part of the School. If such a scheme were formulated, the University could with confidence approach its graduates, and all those interested in the Edinburgh Medical School, with an appeal for financial help, which we feel sure would meet with a generous response.

Conclusion.—In all our deliberations we have borne in mind what we consider to be the essential feature of all progress in the Edinburgh Medical School, namely this—that reform must be based on the experience which the past has afforded. The School occupies a unique position amongst the schools of the world, both in its past history and in its relation to present-day requirements. Advance cannot come from a slavish imitation of the developments of other schools, where the conditions may be wholly different, but by frankly facing the problem of the work to be done and taking count of the resources which are available.

SKELETON TIME-TABLE, EMBODYING THE ALTERATIONS WE HAVE SUGGESTED.

First Year.

Summer Term.—First Summer.

Biology—{50 lectures.
50 hours' practical work.

Physics—{50 lectures.
50 hours' practical work.

Examination in Biology and Physics at end of Summer.

Winter.—First Term.

Examination in Biology and Physics for those who have failed in Summer.

Chemistry (Principles)—50 lectures.
Practical Chemistry—50 hours.
Junior Anatomy—50 lectures.
Practical Anatomy.

Winter.—Second Term.

*Chemistry** (Inorganic and Organic)—50 lectures.
Practical Chemistry—50 hours. (Including Inorganic Pharmacognosy.)
Demonstrations in *Regional Anatomy.*
Practical Anatomy.

Examination in Chemistry at end of Winter.

SECOND YEAR.

Summer Term.—Second Summer.

*Organic Chemistry** (including Organic Materia Medica).
Demonstrations and Practical Work, 75 hours.
Histology—Lecture-Demonstrations and Practical Work, 100 hours.
Practical Anatomy.
Practical Examination in Organic Chemistry at end of Summer.
Examination in Chemistry for those who have failed in April.

Winter.—First Term.

Examination in Organic Chemistry for those who have failed in July.
Physiology—50 lectures.
Experimental Physiology—2 hours twice weekly.
Practical Anatomy.

Second Term.

Physiology—30 lectures.
Physiological Chemistry—2 hours weekly.
Senior Anatomy—50 lectures.
Practical Anatomy.

THIRD YEAR.

Summer Term.—Third Summer.

Anatomy—Practical Demonstrations.
Physiology—Practical Demonstrations.

Examination in Anatomy and Physiology.

We have deemed it necessary, in attempting to arrange for the correlation of work in the later subjects of the curriculum, to allocate definite hours to each subject.

* See pages 295 and 296.

Winter.—First Term.

Examination in Anatomy and Physiology for those who have failed in Summer.

9-10—*Junior Surgery*—Lectures three days a week; Tutorials other three days.

*10-12—Tutorial Work in Surgical Wards; Clinique by Assistant Surgeon.

12-1—Ward Clinique by Surgeon, or Operations.

1-2—

2-3—*Pathology*—Lectures three days a week.

2-3—*Practical Pathology* } Class to meet in sections, each thrice
3-4—*Practical Pathology* } weekly.

4-5—*Pharmacology.*

Second Term.

9-10—*Surgery* as in First Term.

*10-12 } Surgical Ward Work as in First Term.
12-1 }

1-2—

2-3—*Pathology*—Lectures three days a week.

3-4 } *Practical Pathology*—Sections.
4-5 }

Examination in Elementary Pathology and Pharmacology.

FOURTH YEAR.

Summer Term.—Fourth Summer.

9-10—*Applied Anatomy.*

*10-12 } Surgical Ward Work as in two previous terms.
12-1 }

1-2—*Post-mortems.*

Practical Work in Pathological Department of Infirmary (in sections).

* These hours during all three terms would be available for the students of each year attending out-patients. The total number of men in a year would be divided into sixths, and each sixth would take out-patients for half a term.

Examination in Elementary Pathology and Pharmacology for those who had failed in April.

Winter.—First Term.

9-10—*Medicine*—Lectures three days a week.

Midwifery and Gynæcology—Lectures three days a week.

10-12—Tutorial Work in Medical Wards, case-taking, &c.

12-1—Clinique by Physician or Assistant Physician.

12-2.30—*Post-mortems.*

Winter.—Second Term.

9-10 { *Medicine*—Lectures, / *Midwifery and Gynæcology*—Lectures, } as in previous term.
10-12—Tutorial Work in Medical Wards as before.
12-1—Clinique by Physician or Assistant Physician.
12-2.30—*Post-mortems.*
4-5—*Therapeutics*—Lectures.

FIFTH YEAR.

Summer Term.—Fifth Summer.

8-9—*Public Health.*
9-10 { *Medicine*—Lectures, / *Midwifery and Gynæcology*—Lectures, } as in previous terms.
10-12—*Special Subjects:*—Diseases of Children, Diseases of the Skin, Diseases of the Eye, Diseases of the Ear and Throat, Clinical Gynæcology. (Each to meet either on Mondays, Wednesdays, Fridays, or Tuesdays, Thursdays, Saturdays.)
Medical Out-patients in Sections.
10-12—Tutorial Work in Medical Wards.
12-1—Clinique by Physician or Assistant Physician.
12-2—*Post-mortems.*
2-3—*Medical Jurisprudence.*
3-4—
4-5—*Advanced Pathology.*
Examination in Medical Jurisprudence and Public Health.

Winter.—First Term.

9-10—Lectures on *Regional Surgery* (three days a week).
9-10—*Medicine* (Special Courses if desired).
10-12—*Special Subjects* as in previous term; Medical Out-patients.
12-1—Senior Surgical Cliniques—three days a week. (Including Venereal Diseases.)
12-1—Senior Medical Cliniques—three days a week. (Including Out-patients.)
1-2—
2-5—*Dispensary*—Sections in *Fevers, Vaccination, Dispensing.*

Winter.—Second Term.

9-10—Lectures on *Regional Surgery* (three days a week).
9-10—*Medicine*, Special Courses if desired, as in previous term.
10-12—*Special Subjects* as in previous term; Medical Out-patients.

12-1—Senior Surgical and Medical Cliniques, as in previous term.
1-2—
2-3—*Mental Diseases.*
3-5—*Dispensary* (Sections in Fevers, &c., as in previous term).

Sixth Summer.

8-10—*Operative Surgery.*
10-2—Clinical Work.

Final Examination in Medicine, Surgery, Midwifery and Gynæcology, Clinical Medicine, Clinical Surgery, Clinical Gynæcology, Advanced Pathology, and Therapeutics.

Submitted to and approved by the Club, July 1909.

THE INFECTION ELEMENT IN CONSUMPTION: A LECTURE DELIVERED AT THE EDINBURGH POST-GRADUATE MEETING, 31ST AUGUST 1909.

By ALEX. JAMES, M.D.

SINCE the times of Pasteur the search for and discovery of organisms associated more or less directly with the various processes of disease has been assiduous and unremitting, and now the study of the nature and life-history of organisms has become a department of scientific medicine. But this most useful spirit of research, gifted to the world by Pasteur, has had, as might indeed be expected, an unfortunate as well as a fortunate effect. This is that, inasmuch as it has required the concentrated attention of all who have devoted themselves to the study of the organism as a subject, it has tended to lessen the attention of its devotees to the many and diverse surrounding and associated conditions.

In this way, in the minds of many, there has been produced a tendency to magnify unduly the importance of the germ, and to minimise unduly the importance of surrounding and associated conditions. This is, of course, what is always witnessed in the onward progress of scientific thought, and this is what time and fuller consideration and investigation always puts right. To time and fuller consideration it might therefore safely be left for rectification, were it not for the fact that at the present time the tendency of the State to concern itself in medical and sociological problems, to a greater extent than it has ever done before, has caused the State to seek for counsel and guidance from its scientific medical leaders to an extent which it has never done before.

If now, in the advice and counsel which it gets, there is something which lacks what time and fuller consideration would have given, and if this something, instead of remaining a simple and harmless scientific hypothesis, which can change with every breath of heaven, becomes a hard-and-fast legal enactment, it is evident that our science, instead of being a powerful factor for good to the State, may be one for harm.

And now to concentrate what has just been said on the subject of pulmonary and other tubercular diseases. You all know that for the eradication of tubercular disease efforts to kill off the germ are by some regarded as all-important, whilst by others, efforts to improve the condition of the soil are regarded as the *sine quæ non*. In the minds of the first, tubercular disease appears etiologically as syphilis appears to the majority of the profession;

to the minds of the second it appears as pneumonia does. Let me illustrate this a little further.

Syphilis made its appearance in Europe in the fifteenth century, and, spreading in a way which can only be explained by that of personal contact, it rapidly affected the majority of the people living at the time, from kings and emperors and the reigning Pope downwards. Nothing else than direct contact led to its spread. There was then no special change in the life of the people, no big increase in population, no special aggregation of people in centres, such as has been occurring in modern times with the growth of towns; the spread was always the simple result of direct infection from person to person. Since then the disease has always been with us, and now, as then, is always the direct result of infection.

True, its virulence has to some extent abated, in great part as the result of better lives lived now, but doubtless to some extent also as the result of the virus becoming less virulent, or the soil less susceptible. How powerfully the condition of the soil can affect it we know by the fact that one attack produces complete immunity, and also by what is known as Colles's law, viz. that the mother of a syphilitic child is often immune without having in any way manifested the symptoms of the disease. We need not here refer to the nature of the syphilitic virus—how it came into the world, and how it came to affect man originally. What for our purpose to-day is important to remember is that syphilis is emphatically an infectious disease, and that practically the only means towards its elimination are efforts to kill off its germ. Quite otherwise is it, however, with pneumonia. The germ of pneumonia exists in the mouths of everyone, except, as it appears, those who chew tobacco. To most of us, I daresay, it appears probable that there it serves a beneficent purpose. When the bodily health falls below a certain standard, and under conditions brought about by season, change of temperature, &c., it acquires a virulence, or the body acquires a susceptibility to it, and an attack of pneumonia is the result. Except under unusual circumstances, infection from another individual has nothing to do with it, and except under unusual circumstances its spread by personal infection is not to be feared. It is true that experiments have shown that the germ can be made to acquire an unusual virulence, and also that under certain circumstances, mainly overcrowding and unhealthy dwellings, infection *may* be a source of danger. But what for our purpose again to-day is the important point to remember is, that with pneumonia efforts to kill off the germ are not the practical means to lessen or

eliminate the disease. And now we have our problem before us. Are we, as doctors and citizens, to regard the bacillus tuberculosis as an organism which manifests itself in our midst like the spirochæte of syphilis, or like the pneumococcus of pneumonia? I unhesitatingly express the opinion that it manifests itself to us in the manner of the pneumococcus. And now let me lay before you my reasons for my belief.

Age and Tubercular Disease.—Let me first draw your attention to the question of age in tubercular disease.

As you are all aware, a point often discussed by the older writers was that brain tubercle was the tubercle of childhood, abdominal tubercle the tubercle of boyhood and girlhood, and lung tubercle the tubercle of adult life. In the main, we must all admit that in this the older writers were correct. We hear of tubercular processes being frequently discovered on post-mortem examination in the lungs of the young, and abdominal tubercle being similarly met with in the older. But here I would ask you to bear in mind that what we have to consider is, not indication of tubercle in this or that tissue, but indications that in this or that tissue tubercle is setting up active disease. Tuberculin experiments have shown, or seem to have shown, that tubercular processes are present in many individuals who never present tubercular disease, and who are practically as healthy and long lived as their neighbours. What we have to do, therefore, is to limit our attention to tubercle as causing disease, and if we do this, we must admit that it manifests itself in those different organs at the three periods of life, as those older writers have said.

How is this? The view which I have always held is that it is so as the result of the influence of what we call the soil. That is to say, that the power of the bacillus to affect a tissue is dependent on what we call its trophic power. For example, let us take the brain. We find that it is the largest part of the body at birth, and that it rapidly grows till about the 3rd or 4th year, and that by this time the exuberant trophic power required for its growth is over. If we take the lungs, we find them relatively small at birth, but they go on growing, and attain their limit about the 20th or 21st year. If now we take the abdominal organs, we find that again small at birth, they rapidly grow, but that their maximum growth is over by the 12th or 13th year. In this way the exuberant trophic power of brain is over in very early years, of bowel later, and of lung at adult life. The onset of brain, bowel, and lung tubercle at those different ages therefore, can be

explained on the theory that at those different ages this exuberant trophic power is over.

The fact, however, that occurring at those times, in brain, bowel, and lung respectively, tubercular disease seems, as time goes on, to diminish in frequency, is a point that requires notice. It would seem as if in the tissues, when development, which naturally replaces growth, and which in its nature means change of structure instead of increase in bulk, has fully occurred, that the tissue is then again more resistant to tubercle. It is interesting in this connection to remember that the recent tuberculosis commission found, with their inoculation experiments, that calves were more susceptible than adult cattle.

I am well aware that for the occurrence of brain, bowel, and lung tubercle at those different periods of life, other explanations have been offered. It has been said, for example, that lung tubercle is the tubercle of adults, because infection occurs then mainly by inhalation, and abdominal that of early life, because the source then is more likely to be the ingested milk. But this does not explain brain tubercle, which is the tubercle of infancy—that is the tubercle which occurs at the period of life when the risks from milk should be greatest. Nor does it explain the relative absence of pulmonary phthisis in early years, when the risks from inhalation are certainly quite as great as with adults.

But we have other evidence in favour of the view that the growth and developmental conditions of soil act powerfully in connection with tubercular disease. Many years ago I collected statistics of tubercular joint disease as regards age, and I constructed curves showing the ages at which tubercular disease of the hip, knee, ankle, shoulder, elbow and wrist showed themselves. These curves show that in the lower limb the hip is the earliest to become affected, next in order is the ankle, and lastly the knee; whilst that in the upper limb the elbow tubercle appears earlier than the shoulder and wrist.

For an explanation of this we have only to remember that in these various joints, bone growth and development are completed in the lower limb, first in the hip, next in the ankle, and lastly in the knee; and, again, that in the upper limb, the bones forming the elbow joint are completely ossified before those of the shoulder and wrist. It will thus be seen that although we cannot, in the case at least of all the joints, state that their maximum liability to tubercular disease exists exactly at those periods of life when the excessive nutritive energy required for growth is expended, we can yet clearly trace a connection between tubercular disease and

this nutritive power. The bones forming all these joints have at birth a store of assimilative energy which enables them to go on growing till certain periods of life are reached; in the case of the hip, till between the 16th and 19th years; of the ankle, the 18th and 21st; of the knee, the 21st or 22nd, &c. When, therefore, this assimilative power is, from constitutional or other conditions, deficient, tubercular disease in them will show itself at corresponding periods—in the case of the lower limb, earliest in the hip, later in the ankle, latest in the knee, &c. Indeed, when we reflect on the many and often accidental factors which play a part in the etiology of tubercular joint disease, that such a close correspondence between it and age should obtain, is probably as strong evidence in favour of our theory as any which has been adduced.

Still another piece of evidence is that of tubercle of the larynx and of the testis. Statistics show—what every doctor of experience must have observed—that laryngeal tubercle and tubercle of the testis are very rare before puberty, that is to say, before the physiological process of growth is completed in the case of those parts. Thus, again, we get an idea of how much the powers for harm of the tubercle bacillus depends on the trophic or resistance power of the tissues.

Constitution and Heredity.—By constitution we mean the resistance power to disease organisms possessed by the tissues of an individual as a whole. It is evident that in a way this must correspond to that possessed by the parents, so that if this resistance power is feeble in the parents, this feebleness will show itself in the offspring. In the offspring, this feeble resistance power may show itself as the same disease, or as some other disease; and whilst in the former case we call it heredity, in the latter we call it inateness. Thus phthisis, rheumatism, diabetes, or epilepsy in the offspring of parents with phthisis, rheumatism, diabetes, or epilepsy constitutes heredity, whilst phthisis or rheumatism in the offspring of parents with diabetes or epilepsy, or *vice versâ*, constitutes inateness. A good deal of confusion has occurred in connection with this subject. For example, because statistics have been brought forward now and again showing that out of so many cases of phthisis a family history of phthisis is not specially marked, it has been asserted that family history has little to do with phthisis. The fallacy here will be at once apparent. No physician ever imagined that the tubercle itself was transmitted—what is transmitted is the feeble resistance power, which can show itself in many other ways. Indeed, if any conclusion can be drawn

from statistics showing the non-prevalence of phthisis in the family of the phthisical, it must be one against the infectiousness of phthisis.

But apart from all this, we must remember that the possibilities of variations as to the amount and strength of the constitutional resistance power transmitted are infinitesimal. It must vary in the same family with the place in the family—for example, in a large family the younger members are often less robust than the older. It must vary at different times, according, for example, as disease, strain, misfortune or accident have made themselves felt during the lives of the parents. In this way in the same family we may meet with individuals presenting great differences as regards this inherited resistance power. We must not, on account of this, be led into minimising the importance of heredity. We must simply acknowledge our weakness, properly to identify, collect and interpret the complex phenomena of its manifestation.

Bearing all this in mind, and specially that what we refer to is the constitutional power to resist or succumb to disease organisms, let us now look at it in a general way, and compare diseases in which the germ is all-important, as small-pox and syphilis, with diseases in which this resistance power is all-important, like insanity and phthisis.

Small-pox.	Syphilis.	Insanity.	Phthisis.
1. Transmission is from mother only.	1. Transmission is from either parent.	1. Transmission is from either parent.	1. Transmission is from either parent.
2. Disease in offspring follows closely on disease in mother.	2. Disease in the offspring follows in all cases the disease in the parent.	2. Disease does not in all cases follow—it often precedes — the development of the disease in the parent.	2. Disease does not in all cases follow—it, or some other tubercular disease often precedes the development of the disease in the parent.
3. The transmitted disease is protective.	3. The inherited disease is protective.	3. The inherited disease is not only non-protective, but predisposing.	3. The inherited disease is not only non-protective but predisposing.
4. Atavism is impossible.	4. The conditions of atavism are not known.	4. The disease may be transmitted by the parent without development.	4. The disease may be transmitted by the parent without development.
		5. Atavism is a frequent and important characteristic.	5. Atavism is a frequent and important characteristic.

Here the resemblance between phthisis and insanity is as complete as is their distinction from small-pox and syphilis.

The Germ.—Ever since the days of Adam there has been a hereditary tendency in man, whenever any misfortune happens to him, to lay the blame for that on something outside himself. Adam blamed the woman; subsequently, by his progeny, the devil has often been blamed; at present the tendency is to blame the germ. We can easily understand why people cling to the germ for reprehension. The idea acquits the individual, and with him his family, of all responsibility for his illness. And although it fixes the responsibility on some other thing or other individual, or perhaps in these days on the State, this is usually done so vaguely that no great general dissatisfaction is excited.

In connection with phthisis, the sources of infection may be the milk from tubercular cows ingested, or germ-laden air from tubercular patients inspired. Moreover, whilst the intestinal and gland tubercle of early years is ascribed to the former, the lung tubercle of adult life is usually ascribed to the latter. Whilst I admit that milk from cows with tubercular disease is a very grave source of danger, I am of opinion that the fact that the tubercle of adult life is lung tubercle has just as much or as little to do with inspired germs as has the brain tubercle of infancy, or the intestinal tubercle of boyhood or girlhood.

Let us now, however, discuss this tubercle germ and its action in detail.

For this purpose, I believe, I cannot do better than review with you some of the findings of the Royal Commission appointed to inquire into the relation of human and animal tuberculosis, and reported in 1907. The special purposes of this Commission were to discover—

I. Whether the disease in animals and man is one and the same.

II. Whether animals and man can be reciprocally infected with it.

III. Under what conditions, if at all, the transmission of the disease from animals to man takes place, and what are the circumstances, favourable or unfavourable, to such transmission.

As to I. and II., little need be said. I do not think that any physician of knowledge and experience ever doubted that the disease in animals and in man is one and the same, and that animals and man can be reciprocally infected. Of course the experimentalist finds differences in degree, as regards, for example,

the relative virulence of bovine bacilli and human bacilli on bovines, just as he finds on testing the relative efficiency of bovine cultures and human cultures in producing the cuticular reactions in man. But these are simply details.

And now, as to some of the results obtained by this Commission.

In the first place, we have to notice that, in the experimental transmission of bovine tuberculosis to bovines by hypodermic injection, &c., it was found that the harmful effects varied much according to the dose, *i.e.* according to the number of bacilli injected. In this way we can at once remark a great difference between the tubercle organism and that of small-pox or syphilis.

In the second place, another condition deserves notice (page 9): "Two calves (130 and 124) each received, in the form of an emulsion, the same estimated dose (9000) bacilli of the same emulsion of Virus 1. Yet Calf 124 died of general progressive tuberculosis, while Calf 130, killed in apparent good health, showed only a very limited retrogressive tuberculosis. Not only with emulsions from bovine sources, but also with those from human sources, and with cultures also when doses smaller than 50 mgrs. were given, we have found similar striking differences between the effects of the same dose of the same material on two animals of about the same age and weight, and apparently in the same condition of health."

"The effect produced in a tissue of a living animal by the lodgment of a group of tubercle bacilli is the result of a combat between the pathogenic energies of the bacilli, and what has been called the 'resistance' of the tissues. According as the one or the other is the stronger, a tuberculosis more or less progressive is set up, or a tuberculosis after being set up retrogresses with greater or less rapidity, or no tuberculosis at all is set up. We are led to the conclusion that in the case of the calves just mentioned, while the pathogenic energies of the bacilli injected were the same, in the two cases, the powers of resistance of Calf 130 were far greater than those of Calf 124; and so in other cases."

But the results of the experimental transmission of human tuberculosis to bovines are excessively interesting in another way. The experimentalists divided the human tubercular material used into two groups.

Group I. consisted "of viruses obtained in one case from sputum feeding, in three cases from tuberculous cervical glands removed by operation, and in ten cases from the lesions of cases of primary abdominal tuberculosis. All the cases of abdominal

tuberculosis occurred in children and showed some distinctive feature demonstrating the primary origin of the disease. In some there was ulceration of the intestine, in others there was tuberculous peritonitis. All showed caseation of the mesenteric glands. In some cases the patient had died of generalised tuberculosis. In all cases the mesenteric glands were used for investigation, but in some of those in which there was generalisation of the disease, lesions remote from the mesenteric glands were also used, such as those occurring in the bronchial glands, lungs, and meninges."

"Group II. This group, much larger than Group I., is made up of forty cases of very different kinds. In some cases the material consisted of cervical glands removed by operation. In eight others it consisted of mesenteric glands removed after death from cases in which the disease seemed to be of alimentary origin, and was either a general tuberculosis, or a more localized affection. In others, again, ten in all, the material consisted of lungs or bronchial glands from cases in which the disease was of respiratory origin, mainly cases of pulmonary tuberculosis, mostly advanced, though generally in an acute phase. One case was that of a tuberculous kidney, another was that of a tuberculous testis. All the rest, nine in number, were cases of affections of the joints or bones. Our studies of these cases have led us to the conclusion that the bacillus in all of them possessed certain common features." In the summary of the effects of the bacilli obtained in this way, we find it stated, "It is clear that the effects produced by the introduction of the bacillus from the cases of human tuberculosis forming Group I. are in every respect one and the same as the effects produced by the introduction of bovine tuberculosis."

"But it is no less clear that the effects produced by the introduction of Group II. of cases of human tuberculosis are in one respect markedly different. The bacillus of Group II. is far less virulent than the bacillus of bovine tuberculosis; it is so much less virulent that, even in very large doses, it does not set up generalised progressive tuberculosis in the bodies of bovines and rabbits; when injected subcutaneously, its virulence is unable to overcome the 'powers of resistance' of the tissues of these animals, and these powers either soon arrest the progress of any tuberculosis which may have begun, and make the disease retrogress or (in some few cases) prevent the disease being set up at all. This difference is so pronounced, it affords so sharp a line of demarcation between the effects of the bacillus of Group II. and the effects of the bacillus of bovine tuberculosis, that we might be

led to regard it as a difference in kind, and to conclude that the former effects are not one and the same as the latter. Before we accept this conclusion, however, the following considerations deserve attention."

"In the first place, it might be urged that the fact that a culture in a dose of 50 mgrs. produced generalised progressive tuberculosis in each of the cases of bovine tuberculosis examined by us (and in each of the cases of Group I.), but in none of the cases of Group II., does not justify us in concluding that the bacillus in each case of bovine tuberculosis (or of Group I.) possessed an equally high degree of virulence, and that the bacillus in each case of Group II. possessed an equally low degree of virulence. As we have said, we do not at present possess an adequate means of estimating small differences in virulence; it is possible that the bacilli in question do differ to a certain extent in virulence among themselves. If this be so, and if we were able to ascertain how far the most virulent bacillus of Group II. falls behind the least virulent bacillus of bovine tuberculosis, the result might show the difference between Group II. and bovine tuberculosis, though beyond doubt very great, to be not so great as is indicated by the results obtained with the subcutaneous injection of 50 mgrs. of culture."

That is to say that, like the pneumococcus, the bacillus of tubercle must vary from practical harmlessness to virulence.

From these experimental results two important generalisations can be made :—

I. That with bacilli of the same virulence and in the same quantity, administered to two animals of the same weight, and apparently equally well nourished, one can be made fatally ill, and the other can hardly be harmed at all.

II. That with bacilli presenting the same microscopical and bacteriological properties, one can be virulent, the other can be practically harmless.

Now, remembering that this difference in the susceptibility of individuals, and this difference in the harm-producing effects of organisms, can be recognised in almost all diseases, we can yet say that there are some diseases in which such differences are marked and others in which they are not. As examples of these, I would take again the two diseases which we have already compared with phthisis, viz. syphilis and pneumonia. In syphilis, as we have seen, the germ, as it practically always produces the disease, is of the greatest practical importance—in pneumonia it is not. We

know that the pneumococcus can be made virulent to animals, and we know that the pneumococcus is virulent in pneumonia. We know that in a non-virulent form, it is in the mouths of everybody.

Is there anything against the idea that the tubercle bacillus is, like the pneumococcus, a widely-spread organism performing in its proper place, a useful function, and becoming virulent only when in one way or other, the laws of health in animals and in man are being violated? Let me now tell you what we have been doing within the last few months in connection with this subject.

Recognising that the cuticular reaction test gives opportunities of investigation which we had not before, I have been employing it for some time. As you know, the ordinary method of using it is to puncture or abrade the skin at two places, one place being inoculated with the tuberculin, the other left as a control. Acting in this way, we have found:—

I. As others have found, that whilst in the advanced and emaciated cases of phthisis little reaction is obtained, in the strong and well-nourished cases, a marked reaction is the rule.

II. That in many cases sent in as phthisis, so long as they are in good condition, a marked reaction is obtained, although repeated examination of the spit fails to reveal tubercle bacilli.

III. That in patients weakly and emaciated from other causes than tubercular disease, no reaction is obtainable.

IV. That, on pitting Koch's human tuberculin (K. O.) against his bovine tuberculin (P. T. O.), we find, as others have done, that the stronger reaction is in most cases obtained by the former.

But we have developed the control observations a little further. Thus, in one set of experiments we prepared three spots; the first we inoculated with K. O., the second with one or other of the following fluids—anti-streptococcus serum, staphylococcus vaccine and typhoid vaccine—and the third we left as a control. We found that these three fluids gave results differing little from the control. For the first 24 or 36 hours they showed a little more redness, but this soon disappeared, and they presented nothing which could be compared to the reaction at the spot inoculated with the tuberculin. Still there was something which was noteworthy, and this was that, if the phthisical individual tested in this way was weakly and emaciated, the same distinct want of reaction which was evident to the K. O. was evident also to these other substances.

Then we proceeded further. Remembering that there are other acid-fast bacilli, I was able to obtain from Dr. Shennan

cultures of two of these, viz. the Timothy grass bacillus and the smegma bacillus, and Dr. Ritchie and Dr. Aikman of the City Hospital kindly made sterilised cultures of them, just as tuberculin is of the tubercle bacillus. These, therefore, we have been pitting against K. O. and P. T. O., and certainly we get with them reactions which, though not so strong as with the tuberculins, yet appear to us to be of the same nature. I show you some of our patients who have been inoculated in this way, and though they may not show at present the effects as well as others which we have had done, they yet, I think, demonstrate the great similarity which I claim. We are pursuing our investigations, and we are endeavouring to experimentally increase the virulence of these organisms, and we hope in time to get still more distinct results. For the present, however, I think I can affirm that with the Timothy, and to a less extent with the smegma cultures, we get reactions akin to those produced by the tuberculins.

And now as to the question which we have already had before us. Is there a possibility that the bacillus of tubercle is really a widespread organism, performing, as in Timothy grass, &c., a useful function, and becoming virulent only when, through ignorance, sloth, greed or vice, man puts man and animals under unhealthy surroundings? I unhesitatingly say that there is; in my own mind I feel certain of it.

State Treatment of Tubercular Disease.—But probably no better illustration of what I wish to put before you as to the disease phthisis depending on the patient's constitution and surroundings rather than on the germ, can be had than the statistics of our City Hospital phthisis wards. These wards were opened in order to admit patients dying of phthisis—patients who, if left at home, might be a danger to the community. The number of beds was 50, and as it was supposed that each patient would live not over 3 months, this, it was held, would enable 200 cases dangerous to the public to be segregated yearly. Let me now point out what has happened.

During the first year, 1906, 104 cases were admitted; the mortality was 42 per cent., the rate of discharge, 23 per cent. During the second year, 1907, 130 cases were admitted; the mortality was 62 per cent., the discharges, 34 per cent. During the third year, 1908, 143 were admitted; the mortality was 51 per cent., the discharges, 36 per cent.

To those of us who are experienced in the disease phthisis, it will be a matter of no surprise to know that, *ceteris paribus*, the

worse the surroundings in which a patient's life was being spent, the better were the results obtained by treatment in these wards. All who have had experience well know that when we are brought face to face with a case of phthisis which has developed under health-giving surroundings, we are proportionately helpless.

And now when we reflect on what better surroundings can do, to lengthen the days of people supposed to be dying of phthisis, we can form an idea of what better surroundings would do in a municipal institution for early cases. That it would prolong life in individual cases is certain, but it is equally certain that unless the better surroundings were continued, the patient would relapse again. It is also certain that the number of those claiming admission to State institutions would increase every year. The question, therefore, becomes one of political economy. Personally, I am against State institutions of this kind. No one has greater sympathy with the phthisical than I have, and no one would more willingly help them. But if an individual, on becoming unfit for employment, is led to feel that, be this unfitness the result of misfortune or misconduct, he can demand as a right assistance from his fellow-men, the result will be a violation of the law of God, that "as ye sow, so shall ye reap," and the number of those who rely upon help from the State will increase. Some there are who will say that, though this might be the initial effect of State assumption of individual responsibilities, yet this will only be temporary. They will say that the State will soon find out whether an individual is relying for more than his due share on the State or not, and that when it discovers that an individual in his acts is not honestly acquitting himself as a citizen, it will find means of compelling him to do so. But can the State discover if a man is really honest? Of course, when an individual is flagrantly dishonest the State can interfere, just as when an individual is flagrantly diseased, or flagrantly anything bad, and I am one of those who hold that, for flagrant disease, flagrant insobriety, flagrant neglect and flagrant uncleanliness, State interference is not, by a very long way, drastic enough. But is it to State interference that we look to raise the standard of honesty among the bulk of the people? As Burns has said—

> "A king can mak' a belted knight,
> A marquis, duke, and a' that,
> But an honest man is abune his might."

What is above the might of a king is above the might of a Parliament; and, moreover, what is true of the honesty of a people is equally true of the health.

ON REMOVAL OF THE NORMAL APPENDIX.

By H. A. LEDIARD, M.D., F.R.C.S.,
Surgeon to the Cumberland Infirmary.

In order to facilitate reference to what follows, I make the proposition "that it is a wise and prudent precaution to remove the healthy or normal appendix in childhood," and I shall endeavour to justify my thesis by the arguments which compose this paper.

To dwell upon the universality of such a common disease as appendicitis, or the number of victims claimed each year, would seem to be a useless task, because all surgeons, physicians and general practitioners have their own practical experience of the frequency of appendicitis in their own practices or in their districts. This practical experience cannot be expressed in figures, for obvious reasons, so that I go to a Blue Book—a source of information which is open to everyone, whether professional or layman.

Truth has been stated to be relative rather than absolute, and this holds good for statistics of mortalities, found in the columns of the Registrar-General's Report, which contains an enormous mass of information, which year by year becomes more interesting, accurate, and more practically useful.

For example, it was not until the beginning of the present century that the deaths from appendicitis were separately given in the official tables, so that it is now possible to read the number of deaths each year attributable to this cause.

The mortality from appendicitis in the last six years has averaged 63 per million in males and 41 per million in females.[1]

In both sexes deaths are recorded at all ages, but for the most part the mortality has been highest between the tenth and the twentieth year. Deaths at the age of 3 to 6 months and of over 75 years are included.

At page 30 of the Report it will be seen that in 1906 2144 persons of all ages died of appendicitis in England and Wales.

Now, if 2144 persons died, how many suffered from the same disease and recovered? How many girls, boys, men and women had their school work, their holidays, their employments, or their

[1] See Registrar-General's Report for England and Wales for 1908, p. 461.

household duties or pleasures interrupted, spoiled or ruined by an attack of the disease, with or without an operation superadded?

It would be an impossible task to estimate the loss of time and labour by the patients who contract appendicitis and yet make good recoveries, and so estimate the total number of the males and females recovering or dying of this disease.

Statistics of operations upon those recovering are not to be had, except partially, in the reports published by the hospitals of the United Kingdom. It is therefore only from the Registrar-General that some idea can be had of the amount of appendicitis in the country.

The total amount may be larger or smaller than I care to state, but a day will come when the total number of persons attacked will be better known than it is at present.

What is the value of the appendix to the possessor?

What function does the appendix perform?

Is the appendix missed when it has been removed by the surgeon?

These questions will be answered one by one.

The appendix is of no value to its possessor at all; it represents something wanted during the embryonic stage of the growth of the human species and some other animals, but something not required during the independent life of man; that is to say, that an infant boy or girl has no more use for the appendix than a man of 75 or 85 years of age.

The appendix performs no function, or functionates so slightly that the amount is a negligible quantity. No one misses it when it is away, no one knows that he has one until it becomes diseased.

On the other hand, it has been proved beyond doubt, before it was ever operated upon, to have been a trap to catch all sorts of extraneous articles taken by the mouth as food or otherwise.

A *cul-de-sac*, a blind alley, in which pins, shot, seeds, concretions, threads, hairs, bits of bone, metal, etc., etc., are caught and imprisoned, and freed only when perforation has been induced by the irritation such foreign bodies create.

Some have imagined that the appendix is in an unexplained manner useful in the human economy, because, being there, it of course has some special value, which we, in our ignorance, are unable to trace.

The writer is not of those holding the good or hidden good of the appendix, because the death-roll seems to speak plainly in the other direction.

The appendix performs no function, is of no value to the possessor of one, and has never in the widest world been missed after it has been removed.

What then?

My answer is as follows:—

The Jews, according to their religion, performed an operation, which Christians in all countries are found adopting of their own instance.

Circumcision—an operation done on boy babies for sanitary reasons only—is submitted to, is solicited by parents, and is performed by medical practitioners all over the world.

If circumcision is believed to be an improvement on human anatomy, are there not other improvements which may be of rather more general application and done for stronger reasons?

If circumcision is a useful, justifiable, and civilised procedure, the same would hold good for appendectomy, and the more so because the reasons for circumcision do not embrace death, whereas the removal of the appendix would save in one year 2144 lives, and render safe from attack all the other persons seized with appendicitis, the number of whom it would be impossible to calculate with accuracy.

Perhaps the reader of this paper will receive a shock—very likely he may; but what of the shock if his child, at the age of 5, dies, after a ten days' illness of appendicitis and an operation thrown in?

It has been shown that no age, tender or advanced, is exempt from the liability to death from appendicitis, and it has been demonstrated that between 10 and 20 years the highest mortality has been recorded.

The writer counsels the early excision of the normal appendix at the earliest possible age, girls and boys to be dealt with on terms of equality.

It is clear that it would be imprudent to take each and every child indiscriminately, at an early age, say, under 12 months, for operation, but a healthy infant could quite well be submitted for normal appendectomy, with a benefit lasting for a lifetime, and the removal of a cause of illness and of death for ever.

When one thinks over the valuable lives of men and women, lives valued by friends and relations, no less than by the village, town, city or district in which they have lived, the question of submitting an infant to such an operation as removal of the normal appendix shrinks into insignificance.

But here a point is reached with which it is somewhat difficult to deal, viz. the risk of operation.

It will be admitted at once that the risks of some appendix operations are most grave, because the operation is undertaken when risk to life is already present, and sometimes, indeed often, when the condition is absolutely mortal apart from any operation.

These conditions would not be present in normal appendectomy, and, given skill in the use of anæsthetics, given skill in operating, given safety in surroundings, and given a healthy child to start with, it may be said that normal appendectomy is without danger and almost without risk.

The advantages obtained by a successfully-performed normal appendectomy would mean lifelong safety from one of the most troublesome and dangerous forms of disease with which the physician or the surgeon has to deal. Occasionally it has been found that the physician has more progressive ideas than the surgeon who puts on the white gown, and ladies have been met with who are infinitely more progressive and up to date than their own family doctors, but there is no surgeon in the wide world with any experience of appendicitis, perforated appendix, gangrenous appendicitis, appendix abscess, local or diffused, who will not be prepared to advise, to recommend, nay, even urge, the reasonableness of getting in front of these unpleasantnesses, to leave alone mortalities, by removing the normal appendix at the earliest possible and feasible age.

In place of a sudden panic, a helter-skelter rush, and the general upset caused by a hasty operation, so often necessitated in appendicitis, a time is selected, a convenient day is chosen, and normal appendectomy is done with the same calmness and deliberation as a vaccination.

A day will come when views such as these will be accepted and adopted.

In conclusion, a word or two is added about the money expended, the pains taken, the suffering endured, the patience exhibited, upon the vast number of semi-worthless objects which crowd our hospitals.

Humanity requires us to be as careful of an ultra-tubercular patient as of the most vegetable forms of lunacy found in our asylums. Go on with the expense, the suffering, the patience and the pains by all means, but why not make a beginning at the other end, why not prevent the possible expense, the suffering, the anxiety, the almost terror of a possible operation at an uncertain

period of life, by removal of the appendix when it is sound, when the individual is healthy, and when the procedure can be conducted with an almost absolute certainty of immediate success?

The wound of a normally removed appendix is healed in ten days, and a fortnight's confinement to bed would be the average time absorbed, whereas the wound of an appendix abscess in a favourable case will take, on an average, six weeks.

Less doctoring, less nursing, less worry, less confusion in the two weeks than in the six. Less interruption of business for both sexes, at an operation done at from 6 to 18 months than at an operation from 15 to 30 years of age.

An infant has to be fed, clothed, fresh-aired, taught and doctored. If it has crooked legs they are straightened, if it has a hare-lip or a split palate, these defects are seen to; if the child is ruptured the sac is removed, if there is an ugly nævus on the face this is removed, and so on with a variety of complaints or malformations which do not threaten the life of the child either immediately or in the future, except as regards appearance and possible success or entry into certain walks of life, such as the army, navy, civil service, and a variety of other employments where those having some kind of defect are weeded out.

Probably many surgeons and physicians have thought over the proposal made in this paper, but they may have hesitated to place their views on record, they may have been reluctant to recommend such a "fire-guard" against the risks of appendicitis, and have been contented to allow the risks to go until the individual runs up against them.

I am here suggesting a course of action to physicians and surgeons and general practitioners, as the outcome of no little experience in hospital, private and consulting practice, and my experience is common enough.

As years go on there will be less and less seen of the "too late" cases of appendicitis. Diagnosis will be more quickly made, and surgical interference sought for at an earlier moment than it often is at present; the general public will be better informed of the need for early attention to abdominal colic, which may prove the innocent commencement of a fatal perforation or gangrene of the appendix, and, in consequence, call in medical or surgical aid at a more seasonable hour than is sometimes now the case, but all this will not check the attacks of the disease, although the mortality may be reduced. Furthermore, the general public may even go so far as to desire that risk of appendicitis may be removed

by the early removal of the appendix, and in this manner meet the surgeon half way.

Finally, there are men who are seated in academical positions of authority, who have the teaching of the rising physicians and surgeons of the next and following decades—what do they say to the proposal?

THE TREATMENT OF CONSTIPATION IN CHILDREN.

By G. H. MELVILLE DUNLOP, M.D., F.R.C.P.,
Senior Physician to the Royal Hospital for Sick Children.

As I am convinced that many cases of constipation in adult life owe their origin to the acquirement of the habit in childhood, the rectifying of the condition during early life is of great importance, and conduces much to the health, happiness, and comfort of the individual.

As a fire will not burn cheerfully unless the cinders are continually raked out, so, in like manner, an infant cannot be expected to thrive or experience the buoyant happiness of childhood unless the ashes are periodically cleared out of the intestinal canal. In order to intelligently understand the methods to be adopted to overcome the constipated habit, we must first carefully study the causes which are principally responsible for its production. We should endeavour to discover whether the seat of the mischief is in the rectum, upper part of the colon, or in the small intestine, whether the condition owes its origin to deficient secretion of the intestinal glands and liver, or whether it is due to atony and insufficient muscular contraction of the intestine.

Chief amongst the causes bringing about constipation, I have no hesitation in placing the neglect of attending to the calls of nature in early life. A child leads such an active, busy life, and is so fussily interested in his various occupations and in his play, that he is very apt to overlook, neglect, or even restrain the gentle pleadings of the bowel to be evacuated. Toleration of nature's normal stimulation soon becomes established, and eventually fails to be appreciated, and no response takes place. The child does not understand the importance of disregarding the warning, and the responsibility therefore falls on the mother or nurse, and the necessity of not allowing a day to pass without ascertaining that the child's bowels have been evacuated, cannot be too strongly impressed upon them. Even in young babies the habit is easily acquired if attention is paid to the matter. I have not seldom seen babies trained within a few weeks after birth, so that a napkin was seldom, if ever, subsequently soiled. The nurse "holds the baby out" in the recognised position, and uttering some mystical, musical shibboleth, the freemasonry of which

seems to be confined to babies and monthly nurses, effects the object she has in view. In older children the child should be "seated" at some stated time of the day, preferably after a meal, as the introduction of food into the stomach seems to have the effect of starting peristaltic movement in the intestine, and he should understand that he is to remain there until the result desired has taken place. It ought to be a golden rule in every nursery that the child should be regularly put into "the position," whether he has any inclination or not. It matters very little what time of the day is chosen, but perhaps in school children, who are in a hurry to get off to school after breakfast, a later period of the day should be selected. Plenty of time should be allowed for this important function. If at the end of ten or fifteen minutes no result has taken place, then I consider it better to insert a glycerine or other suppository than to get no result. By carrying out this system systematically a regular habit almost invariably results. A good deal has to be said in favour of Professor Chiene's suggestion with regard to the construction of water-closets. At any rate, the ordinary adult water-closet is unsuitable for a young child, as he cannot get his feet to the ground, or exert any pressure to favour the expulsive movement.

The administration of too little fluid is another factor in the causation of constipation which I consider of great importance. In many such cases the fæces are so hard and dry that the bowel has great difficulty in voiding them. A child should regularly drink a small tumblerful of cold water night and morning, and much more frequent draughts of water than he is in the habit of getting during the day. The Japanese have taught us much in this particular, which we are slow to learn. The want of sufficient exercise is another factor of importance in causing constipation. It is within the knowledge of everyone who looks after children that it is much more usual to find them suffering from constipation during the winter, when leading sedentary lives, than in the summer, when indulging in healthy outdoor exercises and games. In constipated children this should be borne in mind, and regular, rhythmical, systematic exercises indulged in, especially those causing the bending of the trunk on the legs, and *vice versâ*. Massage does not, in my experience, attain the results so often claimed for it in young infants. In older children I have occasionally seen success from its employment when combined with other means. A pro-

fessional masseuse should be employed, and deep pressure, along with kneading movements, should be exercised in the direction of the colon.

In breast-fed babies the condition is sometimes due to constipation in the mother, often brought about by her leading too indolent a life, or drinking too much tea, both of which can be easily rectified by a change in the mother's habits. A deficiency of fat and too little sugar in the milk is a common cause. The addition of malt liquor to the mother's diet has the effect of raising the fat percentage in her milk. A single bottle in the day of, to the baby, some malted food is frequently efficacious. In bottle-fed children the hard, indigestible casein, and deficiency of fat, are the most pregnant causes. These can be overcome by the addition of cream and the greater dilution of the milk, preferably by oatmeal water. It must be remembered that sterilisation of milk is apt to cause constipation, and a change to raw milk is often all that is required. It must also be kept in view that too much fat, as well as too little, is sometimes responsible for the constipation, by causing intestinal indigestion, and covering the faeces with mucus, which renders them slippery and difficult of expulsion. Orange juice and cod-liver oil are especially useful in rickety and scorbutic babies. Dietetic measures should always be tried before drugs, as when the latter are once employed they frequently require to be increased in quantity. No plan is worse than the administration of a purgative every few days. A few grains of phosphate of soda or milk of magnesia, when added to the feeding-bottle, are the drugs I have found most efficacious. Injections or suppositories are not to be recommended for frequent use, as the parts soon become insensitive to stimulation. For occasional use, high injections of olive oil are sometimes serviceable. Suppositories containing aloin, belladonna, and nux vomica are better than soap and glycerine, which are too stimulating. When the stools are grey or clay coloured and offensive, and accompanied by much flatulence, nothing is better than a course of grey powder. In older children the insistence of cultivating the daily habit is of the greatest importance. In the matter of diet, porridge taken with golden syrup, brown bread with plenty of butter, green vegetables, fruit raw or cooked, the limitation of milk and the avoidance of white bread and the starchy foods are the main dietetic indications. Malt and cod-liver oil in rickety and atrophic children are often invaluable.

I consider the most useful drug to be the various compounds

of cascara. It acts better, I think, when given in small doses, three times a day, than in a larger dose at night, and, when combined with equal parts of liquid extract of liquorice and glycerine, it seldom fails to effect a cure when persevered with for some time. Another old-fashioned method which I have found of great service is the administration of sulphur and cream of tartar. When mixed with syrup of lemons so as to form a paste, it is quite palatable, and readily taken by young children.

MEDICAL EDUCATION IN SCOTLAND.

A CANDIDATE desirous of obtaining a legal qualification to practise medicine must conform to the regulations of the General Medical Council. These regulations require that the candidate must first pass a preliminary examination; must register as a medical student; must study at a recognised school of medicine for at least five years, and must obtain a registrable degree or diploma in order that his name may be entered on the official list of medical practitioners, the *Medical Register*.

Degrees.—The Scottish Universities confer the degrees of Bachelor of Medicine and Bachelor of Surgery (M.B., Ch.B.) on candidates who have attained the age of twenty-one. These degrees admit to the *Medical Register*. The higher degrees, Doctor of Medicine (M.D.), Master of Surgery (Ch.M.), may be registered as additional qualifications.

Diplomas.—The Royal College of Physicians of Edinburgh, the Royal College of Surgeons of Edinburgh, and the Faculty of Physicians and Surgeons of Glasgow co-operate in conducting Examinations for the *Triple Qualification* (L.R.C.P.E., L.R.C.S.E., L.F.P.S.G.), which admits to the *Medical Register*. Like the higher degrees of the Universities, the Fellowships and Licenses of any of these corporations may be registered as additional qualifications.

THE UNIVERSITIES.

PRELIMINARY EXAMINATION.—Each student must pass this examination before commencing medical study. At the matriculation office of each University, candidates can obtain schedules, which must be filled up and lodged not later than certain dates in March and September respectively. The fee for examination is 10s. 6d., and should be paid at the time of lodging the schedule. Candidates are examined on the following subjects:—

(1) *English.*—There is one paper comprising two questions on British History, two on Geography, four on Grammar (correction of sentences, parsing, analysis of sentences, and derivations), two of a literary and general nature, and the candidate has also to write an essay, and paraphrase a portion of verse. Answers are required to eight questions, and one answer in History, one in Geography; the essay and the paraphrase are essential.

(2) *Latin.*—Translation, Parsing, Grammar, Prose Composition, and Sentences.

(3) *Elementary Mathematics.*—(*a*) Arithmetic (fractions, proportion,

percentage, square root, and simple interest); (*b*) Algebra (fractions, factors, square root, equations of the first degree, simultaneous equations of the first degree, quadratic equations and problems leading thereto); (*c*) Geometry (Euclid, Books I., II. and III., or their equivalents, with simple deductions).

(4) *Greek, or French or German.*

French or German.—Grammar, translation into English and into French or German, and short idiomatic sentences for translation from English.

Greek.—Grammar, translation into English, and of short sentences into Greek.

In the case of a candidate whose native language is not English, an examination in the native language of the candidate may be substituted for one in either French or German, and an examination in any other classical language for one in Latin or Greek.

It is compulsory that the subjects be passed at not more than two examinations, but there is no restriction on the number of times the candidate may present himself for examination. A degree in Arts or Science in any University of the United Kingdom, and in any Colonial or Foreign University specially recognised; the Lower Grade Leaving Certificate of the Scottish Education Department, and certain other examinations, are accepted as equivalents for the preliminary examination. The preliminary examination conducted by the Educational Institute of Scotland is not accepted as an equivalent examination.

MATRICULATION.—Having passed the preliminary examination, the student must, within fifteen days after the commencement of the session, make the required entries in the Matriculation Album of the University, and pay the matriculation fee, which is one guinea for the whole year, half a guinea for the summer session alone. The student must matriculate each year of study.

REGISTRATION.—Within fifteen days after commencement of study, he must register as a medical student. He must be not less than sixteen years of age, must have passed the preliminary examination, and must produce to the Registrar (James Robertson, Esq., 54 George Square, Edinburgh) an application form duly filled up, showing that he has commenced medical study.

THE CARNEGIE TRUST.—This Trust is prepared to pay the class fees of students (who have passed the specified preliminary examination) for all classes, whether attended within the Universities or in any of the Extra-Mural Schools. The Trust is also prepared to pay the class fees for students proceeding to the Triple Qualification, provided that the applicant has passed the preliminary examination recognised by the Trust. It is also prepared to pay the fees for the various special classes given by many of the Lecturers upon advanced and non-compulsory subjects. Three qualifications are demanded: the

applicant (1) must be over sixteen years of age; (2) must be of Scottish birth or extraction, or must have given two years' attendance after the age of fourteen at a school or institution under inspection of the Scottish Education Department; and (3) must be qualified by preliminary examination under the ordinances of the Scottish Universities Commission and the regulations of the Joint Board of Examiners, to attend the classes for which payment of fees has been claimed. Schedules of application for admission to the benefit of the Trust are obtainable by written application to the Secretary of the Trust, 14 Hanover Street, Edinburgh.

PROFESSIONAL EDUCATION AT THE UNIVERSITIES.

At the present time the medical curriculum suffers from overcrowding. This has arisen from the rapid growth of medical science, and the attempts which have been made from time to time to graft new subjects on to an old system.

The Universities of St. Andrews, Glasgow and Aberdeen are at present considering a joint scheme for the reformation of the curriculum which will permit of greater elasticity.

Edinburgh University has not co-operated with the other Scottish Universities in the present instance, but not because the need of reform is less clamant in Edinburgh than elsewhere.

EDINBURGH UNIVERSITY.

The following order of study is recommended :—

A.—For Students Beginning in Winter.

FIRST YEAR.

First Half of the Winter Session—
Chemistry.
„ (Practical).
Anatomy.
Physics.
Examination in Physics.

Second Half of the Winter Session—
Chemistry—*continued.*
„ (Practical)—*continued.*
Anatomy (Practical).
Examination in Chemistry.

Summer Session—

Botany.
„ (Practical).
Zoology.
„ (Practical).
Anatomy (Practical).

Examination in Botany and Zoology.

SECOND YEAR.

First Half of the Winter Session—

Anatomy (Practical).
Physiology.
„ (Experimental).

Second Half of the Winter Session—

Anatomy (Senior).
„ (Practical).
Anatomical Demonstrations.
Physiology—*continued.*
„ (Chemical).

Summer Session—

Anatomy (Practical).
Anatomical Demonstrations.
Histology.

Examination in Physiology.

THIRD YEAR.

First Half of the Winter Session—

Surgery.
Pathology.
„ (Practical).
Anatomical Demonstrations.
Anatomy (Practical).
Hospital Attendance.

Examination in Anatomy.

Second Half of the Winter Session—

Surgery—*continued.*
Pathology—*continued.*
Clinical Surgery.
* Materia Medica (Practical).

* May be taken in Summer following.

Post-Mortems.
Vaccination.

Examination in Practical Materia Medica (if not taken previously).

Summer Session—

Practical Pathology (if not taken in Winter).
Clinical Surgery.
Post-Mortems.

Examination in Pathology.

FOURTH YEAR.

First Half of the Winter Session—

Medicine.
Materia Medica.
Midwifery (including System. Gynæcol.).
Clinical Medicine.
Medical Out-Patients.
Dispensary.
Fevers.

Second Half of the Winter Session—

Medicine—*continued.*
Materia Medica—*continued.*
Midwifery—*continued.*
Clinical Medicine.
Medical Out-Patients.
Dispensary.
Fevers.

Examination in Materia Medica.

Summer Session—

Operative Surgery.
Public Health.
Forensic Medicine.
Mental Diseases.
Clinical Medicine.
Medical Out-Patients.
Maternity Cliniques.
* *A.* Ophthalmology. / Diseases of the Skin.
* *B.* Clinical Gynæcology. / Larynx, Ear and Nose.
* *C.* Diseases of Children.

Examination in Forensic Medicine and Public Health.

* May be taken in Fifth Year. These subjects should be taken according to the above grouping, and only one of the groups, *A*., *B*. or *C*. should be taken at a time.

FIFTH YEAR.

First Half of the Winter Session—

Clinical Surgery.

Examination in Midwifery.

Second Half of the Winter Session—

Clinical Medicine.
Surgical Out-Patients.

Examination in Systematic Medicine and Surgery.

Summer Session—

Clinical Medicine or Clinical Surgery.

Examination in Clinical Medicine, Clinical Surgery, and Clinical Gynæcology.

B.—For Students beginning in Summer.

First Summer Session—

Botany.
„ (Practical).
Zoology.
„ (Practical).

Examination in Botany and Zoology.

FIRST YEAR.

First Half of the Winter Session—

Chemistry.
„ (Practical).
Anatomy.
Physics.

Examination in Physics.

Second Half of the Winter Session—

Chemistry—*continued.*
„ (Practical)—*continued.*
Anatomy (Practical).

Examination in Chemistry.

Summer Session—

Anatomy (Practical).
Histology.

SECOND YEAR.

First Half of the Winter Session—

Anatomy (Practical).
Physiology.
„ (Experimental).

Second Half of the Winter Session—

Anatomy (Senior).
„ (Practical).
Anatomical Demonstrations.
Physiology—*continued.*
„ (Chemical).

Examination in Physiology.

Summer Session—

Anatomical Demonstrations.
Anatomy (Practical).
Pathology (Practical).
Surgical Out-Patients.

THIRD, FOURTH AND FIFTH YEARS.

Same as in the case of students beginning in Winter.

The candidate must attend Hospital for not less than three years: must attend both Clinical Medicine and Clinical Surgery for a period of at least nine months; twenty-five cases of Midwifery, or twelve cases and three months' attendance at a Maternity Hospital; and Post-Mortem Examinations for three months.

It is required that, before commencing the study of Practical Midwifery, every student shall have held the offices of Clinical Medical Clerk and Surgical Dresser, and have attended a Course of Lectures on Surgery and Midwifery.

Two of the five years of study must be spent at the University, and not less than eight of the compulsory subjects of study must be taken in the University.

The minimum expense of M.B. and Ch.B., including fees for Classes, Hospital, Matriculation and Examination, amounts to about £143.

The University degrees are conferred on women students.

A complete curriculum is given by the School of Medicine for Women, Surgeon's Hall.

DEGREE OF M.D.

Each candidate for this degree, under the New Regulations, must be of the age of twenty-four years or upwards, and must have obtained the degrees of M.B. and Ch.B. of the University. He must either have

been engaged for two years in general practice, *or* for one year in the naval or military medical services, or in the medical wards of a hospital, or in scientific research. He must present a thesis written by himself on a medical subject, and pass an examination in Clinical Medicine. In this examination the candidate has to write a report and commentary on at least three cases, and has to show a practical knowledge in the application of the ophthalmoscope, laryngoscope, electrical apparatus, and sphygmograph, in the examination of the blood, and in the chemical and microscopical examination of the excreta.

The candidate who has graduated M.B. and C.M. under the old regulations may either proceed to the degree of M.D. under the old regulations (under which he is not required to pass an examination in Clinical Medicine, but must have passed examinations in Greek and in Logic or Moral Philosophy), or he may proceed to the degree as if he had graduated M.B., Ch.B. under the New Regulations.

Degree of Ch.M.

Each candidate must be not less than twenty-four years of age, must possess the degrees of M.B., Ch.B., must have attended the surgical wards of a hospital for one year, or have spent one year in scientific research or in the naval or military medical services, or two years in practice other than that restricted to medicine. He must submit a thesis on a surgical subject, and pass an examination on clinical surgery and its branches, surgical anatomy, and operations on the dead body.

Fees for M.D. and Ch.M.

The fee for the M.D. degree under the old regulations is five guineas; for the M.D. or Ch.M., under the New Regulations, ten guineas. The candidate must have paid the matriculation fee for the year in which he presents himself for examination or graduation. At each reappearance for examination, under the New Regulations, the fee is five guineas.

DEGREES IN PUBLIC HEALTH.

Two degrees are granted by the University of Edinburgh in the department of Sanitary Science, viz., B.Sc. and D.Sc.

Bachelor of Science.

Candidates must be graduates in Medicine of a University of the United Kingdom or of some other recognised University. In order to obtain the degree two examinations have to be passed.

First Examination.—Before entering for this examination the candidate must, after graduating in Medicine, have worked in a recognised Public Health Laboratory for eight months, of which five

consecutive months must be passed in the Public Health Laboratory of the University of Edinburgh.

He must also have attended in a Scottish University a course of lectures on Physics and a course of lectures on Geology, extending over three months, and both of which are approved of by the University Court.

The subjects of examination are as follows :—

(1) *Laboratory* work—Practical, written and oral ; examination of water, air, foods, beverages, condiments, sewage ; soils ; disinfectants ; building materials ; clothing ; bacteriology.

(2) Physics. (3) Geology.

Second Examination.—This cannot be taken until eighteen months after graduating in medicine ; nor sooner than six months after passing the First B.Sc. Examination. The candidate must have attended two separate courses on Public Health, either in the University of Edinburgh or in some other recognised University or School.

Each course must consist of forty lectures, and includes Medicine in its relation to Public Health and Sanitary Engineering.

The candidate must likewise produce evidence that (1) for six months he has studied sanitary work under a Medical Officer of Health for a county or burgh of not less than 25,000 inhabitants ; (2) that he has studied clinically for three months infectious diseases in a recognised institution ; (3) that for three months he has been instructed by a recognised teacher in mensuration and drawing.

The subjects of examination are :—

(1) Sanitation ; (2) Sanitary Law ; (3) Vital Statistics ; (4) Medicine in Relation to Public Health.

The candidate is examined orally, practically, and by a written paper. *Sanitation* includes making reports on dwellings, workshops, hospitals and sanitary schemes.

The University Court may modify the work and instruction prescribed from time to time.

Doctor of Science.

A graduate after having held the degree of B.Sc. for five years may present himself for the D.Sc. He must present a thesis or a published work or memoirs, the result of his own research, and must pass an examination in Public Health, and in such of its special subjects as the Senatus may determine. The candidate must submit the subject in which he proposes to be examined for approval not less than two months before the examination.

Fees Payable.—First and second examinations, £3, 3s. each ; for D.Sc., £10, 10s.

INSTITUTIONS FOR CLINICAL INSTRUCTION IN EDINBURGH.

Royal Infirmary. 740 beds and 40 cots. Fees—perpetual ticket, £12 ; one year, £6, 6s.; six months, £4, 4s.; three months, £2, 2s. Clinical instruction is given daily in Medicine, Surgery, and all their special branches.

Royal Hospital for Sick Children. 120 beds. Hospital ticket, £1, 1s. Fee for Qualifying Course, £2, 2s.

City Hospital for Infectious Diseases. 600 beds. Fee, £1, 1s.

Royal Maternity and Simpson Memorial Hospital. 40 beds. The Maternity Residency affords accommodation for twelve students.

Royal Asylum, Morningside. 500 beds.

The fee for a qualifying course at each of these last two institutions is £2, 2s.

Victoria Hospital for Consumption and Diseases of the Chest. 50 beds. Out-Patient Department at 26 Lauriston Place.

Eye, Ear and Throat Infirmary. 6 beds; 2700 Out-Patients yearly. Fee for three months, £1, 1s.

Royal, New Town, Medical Missionary (Cowgate), Western, Provident (Marshall Street), Eye, and Skin Dispensaries.

PROFESSORS AND LECTURERS IN EDINBURGH.

The courses given by the Extra-Mural Lecturers are recognised by the University and other examining boards as qualifying for graduation.

Botany— Professor Bayley Balfour, M.D., Botanical Gardens.
James A. Terras, B.Sc., New School.

Zoology— Professor J. Cossar Ewart, M.D., University.
Malcolm Laurie, D.Sc., Surgeons' Hall.
Marion I. Newbigin, D.Sc., Surgeons' Hall.

Biology— Malcolm Laurie, D.Sc., Surgeons' Hall.
Marion I. Newbigin, D.Sc., Surgeons' Hall.

Physics— Professor J. G. MacGregor, D.Sc., University.
C. G. Knott, D.Sc., University.
Dawson Turner, M.D., Surgeons' Hall.

Chemistry— Professor Walker, University.
G. H. Gemmell, F.I.C., 4 Lindsay Place.
T. W. Drinkwater, Ph.D., Surgeons' Hall.

Anatomy— Professor A. Robinson, M.D., University.
J. Ryland Whitaker, M.B., Surgeons' Hall.

Applied Anatomy—
H. J. Stiles, M.B., University.
J. Ryland Whitaker, M.B., Surgeons' Hall.

Physiology— Professor E. A. Schäfer, LL.D., University.
Alexander Goodall, M.D., Surgeons' Hall.

Materia Medica and Therapeutics—
Professor Sir Thomas R. Fraser, M.D., University.
William Craig, M.D., Surgeons' Hall.
Francis D. Boyd, *C.M.G.*, M.D., New School.

Pathology— Professor W. S. Greenfield, M.D., University.
Theodore Shennan, M.D., Surgeons' Hall.
James Miller, M.D., New School.

Surgery— Professor Alexis Thomson, University.
J. W. Dowden, F.R.C.S., New School.
A. A. Scot Skirving, *C.M.G.*, F.R.C.S., 27 Nicolson Square.
Henry Wade, F.R.C.S., Surgeons' Hall.
G. L. Chiene, F.R.C.S., Brighton Street.
J. W. Struthers, F.R.C.S., New School.
W. J. Stuart, F.R.C.S.

Clinical Surgery—
The Surgeons of the Royal Infirmary.

Practice of Medicine—
Professor J. Wyllie, M.D., University.
G. A. Gibson, M.D., New School.
A. Bruce, M.D., New School.
R. W. Philip, M.D., New School.
J. J. Graham Brown, M.D., New School.
W. Russell, M.D., Surgeons' Hall.
Harry Rainy, M.D., 27 Nicolson Square.
R. A. Fleming, M.D., 27 Nicolson Square.
G. Lovell Gulland, M.D., Surgeons' Hall.

Clinical Medicine—
The Physicians of the Royal Infirmary.

Midwifery and Gynæcology—
Professor Sir J. Halliday Croom, M.D., University.
D. Berry Hart, M.D., Surgeons' Hall.
J. W. Ballantyne, M.D., Surgeons' Hall.
A. H. F. Barbour, M.D., University and Royal Infirmary.
F. W. N. Haultain, M.D., New School.
J. Haig Ferguson, M.D., New School.
W. Fordyce, M.D., New School.
N. T. Brewis, F.R.C.S., Royal Infirmary.
J. Lamond Lackie, M.D.
E. M. Inglis, M.B.
John M'Gibbon, M.B., 59 Forrest Road.
G. F. B. Simpson, M.D., New School.

Insanity— T. S. Clouston, M.D., University.
G. M. Robertson, M.D., Royal Asylum.
Sir J. Batty Tuke, M.D., Surgeons' Hall.
John Keay, M.D., Bangour Village Asylum.

Diseases of the Eye—
G. Mackay, M.D., Royal Infirmary.
W. G. Sym, M.D., Royal Infirmary.
A. H. H. Sinclair, M.D. (Ophthalmoscopy), 45 Lauriston Place.
J. V. Paterson, M.B., Cambridge Street.

Vaccination— J. B. Buist, M.D., Western and Cowgate Dispensaries.
W. G. Aitchison Robertson, M.D., D.Sc., Royal Dispensary.

Diseases of Children—
Staff of the Sick Children's Hospital.

Diseases of the Skin—
Norman Walker, M.D., Royal Infirmary.
Frederick Gardiner, M.D., Surgeons' Hall.

Diseases of the Ear, Nose and Throat—
A. Logan Turner, M.D., Royal Infirmary.
J. Malcolm Farquharson, M.B., Royal Infirmary.
J. S. Fraser, M.B., Surgeons' Hall.

Forensic Medicine—
Professor Harvey Littlejohn, F.R.C.S., University.
W. G. Aitchison Robertson, M.D., D.Sc., Surgeons' Hall.

Public Health—
Professor C. Hunter Stewart, M.B., University.
W. G. Aitchison Robertson, M.D., D.Sc., Surgeons' Hall.
Wm. Robertson, M.D., Surgeons' Hall.

Fevers— Alexander James, M.D., City Hospital.
C. B. Ker, M.D., City Hospital.

Bacteriology—
W. E. Carnegie Dickson, M.D., University.
T. Shennan, M.D., Surgeons' Hall.
J. Taylor Grant, M.D., 4 Lindsay Place.
James Miller, M.D., New School.

Diseases of Tropical Climates—
Major D. G. Marshall, I.M.S., University and Surgeons' Hall.

Practical Medicine and Physical Diagnosis—
G. Lovell Gulland, M.D., Surgeons' Hall.
R. A. Fleming, M.D., Nicolson Square.
William Russell, M.D., Surgeons' Hall.

Neurology— J. J. Graham Brown, M.D., New School.

Diseases of the Chest—
R. W. Philip, M.D., 26 Lauriston Place.
G. Lovell Gulland, M.D., 26 Lauriston Place.

Medical Electricity and Röntgen Rays—
Dawson Turner, M.D., Surgeons' Hall.

Diseases of the Blood—
G. Lovell Gulland, M.D., Surgeons' Hall.
Alexander Goodall, M.D., Surgeons' Hall.

Practical Anæsthetics—
D. C. A. M'Allum, University.

History of Medicine—
J. D. Comrie, M.B., University.

GLASGOW UNIVERSITY.

The medical curriculum at the University extends over five years, and the classes are held in the handsome buildings at Gilmorehill, adjacent to which lies the Western Infirmary, where there is an excellent field for clinical and practical work.

The Faculty of Medicine embraces the classes of Botany, Zoology, Physics, Chemistry, Anatomy, Embryology, Physiology, Materia Medica and Therapeutics, Pathology, Medical Jurisprudence and Public Health, Surgery, Clinical Surgery, Practice of Medicine, Clinical Medicine, Midwifery, Insanity, Diseases of the Eye, Diseases of the Ear, Diseases of the Throat and Nose, Diseases of the Skin, and Diseases of Children.

The cost of the medical curriculum is about £126.

Before the commencement of medical and surgical studies the preliminary examination has to be passed. The names of candidates for this examination must be given in and the fee of 10s. 6d. paid to the assistant clerk at the Matriculation Office. At the Matriculation Office successful students can obtain the registration forms, which must be filled up and sent to 54 George Square, Edinburgh.

The University of Glasgow offers many attractions to students. The professorial chairs are occupied by able men, some of them of world-wide renown; the laboratories are new and are large and thoroughly equipped; and in the Western Infirmary, with the recent additions to its surgical theatres and its excellent pathological laboratories and museum, a splendid field of observation is open to the student. There are also extremely good opportunities for practical work in the various dispensaries of the city, in the Maternity Hospital with its large outdoor department, and also at the Royal Hospital for Sick Children, the Eye Infirmary, and the Royal Asylum at Gartnavel.

The Students' Union, situated in the University grounds, is very convenient, and much taken advantage of.

Lodgings are to be found all round the neighbourhood, so that the whole life of the student, his work and his recreation, is drawn into a small circle, within which he can move as busily and as profitably to himself as in any teaching school in the kingdom.

QUEEN MARGARET COLLEGE FOR WOMEN.

A full course of medicine and surgery is obtainable partly at Queen Margaret College, but in recent years the tendency has been to have mixed classes at Gilmorehill. The regulations, fees, &c., are similar to those for men. The buildings are pleasantly situated in grounds of their own, close to the Botanic Gardens. The anatomical department is excellently arranged and most complete. Clinical work is amply provided for in the Royal Infirmary and its Dispensaries, and in the Royal Hospital for Sick Children, the Glasgow Maternity Hospital, the Royal Asylum of Gartnavel, and the Belvidere Fever Hospital. There are also arrangements for special study and research.

Students can have board and lodging at Queen Margaret Hall, within easy reach of the College, at the rate of about one guinea per week.

All information necessary can be obtained from Miss Melville, Queen Margaret College, Glasgow.

ST. MUNGO'S COLLEGE.

This, the Medical School of the Royal Infirmary, the largest hospital in Glasgow, is situated in Cathedral Square, Castle Street, and has car communication with every part of the city. St. Mungo's College is in the Infirmary grounds.

The Infirmary has, including the Ophthalmic Department, over 620 beds, the average number occupied in 1905 being 600. When the reconstruction of the Infirmary, long in progress, is completed, it will have about 700 beds. There are special beds and wards for Diseases of Women, of the Throat, Nose and Ear, Venereal Diseases, Burns, and Septic Cases.

At the Outdoor Department the attendances in 1905 numbered over 62,000. In addition to the large Medical and Surgical Departments, there are Departments for Special Diseases—namely, Diseases of Women, of the Throat and Nose, of the Ear, of the Eye, of the Skin, and of the Teeth. A fully-equipped Electrical Pavilion was opened a few years ago, and year by year the latest and most approved apparatus for

diagnosis and treatment has been added. Wards are set apart for the teaching of women students.

Appointments.—Five House-Physicians and nine House-Surgeons, having a legal qualification in Medicine and Surgery, who board in the Hospital free of charge, are appointed every six months. Clerks and Dressers are appointed by the Physicians and Surgeons. As a large number of cases of Acute Diseases and Accidents of a varied character are received, these appointments are very valuable and desirable.

Fees.—The fees for hospital attendance, including Clinical Lectures and Tutorial Instruction, attendance at the Outdoor Department, at the Pathological Department, Post-mortem Examinations, and the use of the Museum, which has not long since been rearranged and catalogued, are as follows:—For one year, £10, 10s.; for six months, £6, 6s.; for three months, £4, 4s. Students who have paid fees to the amount of £21 to the Glasgow Royal Infirmary are permitted to attend, in any subsequent year or years, one Winter and one Summer Course of Instruction in the Infirmary without further payment; and Students who have paid to any other hospital in the United Kingdom fees, being not less than £21, in virtue of which they are entitled to attend without further payment, shall be admitted as Students of the Royal Infirmary on payment of £3, 3s. for six months, or £1, 11s. 6d. for three months.

ANDERSON'S COLLEGE MEDICAL SCHOOL,

Dumbarton Road, Partick, Glasgow.

The old Institution known as "Anderson's University" was founded by John Anderson, M.A., F.R.S., in 1726, and the medical school connected therewith dates back to the year 1800.

In 1877 the name of the Institution was altered from "Anderson's University" to "Anderson's College." In 1887 the medical school of Anderson's College became a distinct Institution known as "Anderson's College Medical School."

The new buildings are situated in Dumbarton Road, immediately to the west of the entrance of the Western Infirmary and four minutes' walk from the University. They are constructed on the best modern principles, and are provided with all the appliances requisite for the conduct and management of a fully-equipped medical school.

Classes are conducted in all the subjects of the five years' curriculum:—

Anatomy—Professor A. M. Buchanan, M.A., M.D.
Physics—Professor Peter Bennett.
Chemistry—Professor J. Robertson Watson, M.A.

Botany—Professor B. G. Cormack, M.A., B.Sc.
Zoology—Professor Geo. Bell Todd, M.B.
Physiology—Professor
Materia Medica—Professor J. P. Duncan, M.B., B.Sc.
Medical Jurisprudence — Professor Carstairs Douglas, D.Sc., M.D., F.R.S.E.
Midwifery—Professor John Edgar, M.A., B.Sc., M.B.
Surgery—Professor Geo. H. Edington, M.B.
Practice of Medicine—Professor John Cowan, B.A., D.Sc., M.D.
Ophthalmic Medicine and Surgery—T. Spence Meighan, M.B.
Aural Surgery—James Galbraith Connal, M.B.
Diseases of Throat and Nose—John Macintyre, M.B., F.R.S.E.
Mental Diseases—John Carswell, F.F.P.S.G.
Public Health Laboratory—Professor Carstairs Douglas, D.Sc., M.D., F.R.S.E.
Pathology—At the Western or Royal Infirmary.

Degrees and Diplomas.—Certificates of attendance on the classes at Anderson's College Medical School are received by the Universities of London and Durham, by the Royal University of Ireland, and by all the Royal Colleges and Licensing Boards in the United Kingdom. They are also recognised by the Universities of Glasgow and Edinburgh under certain conditions which are stated in the Calendar of this school. The Public Health Laboratory Course is recognised as qualifying for the Diploma granted by the University of Cambridge and by the Scottish Conjoint Board.

Candidates for the Licence in Dental Surgery can obtain at this school the full medical curriculum which is required. The courses special to dentistry are conducted at the Glasgow Dental School, 15 Dalhousie Street.

Malcolm Kerr Bursary in anatomy. Value about £10. Open to students of the junior anatomy class during session 1907-1908.

The Carnegie Trust will pay the fees of students at Anderson's, on conditions regarding which particulars may be obtained from W. S. M'Cormick, LL.D., Carnegie Trust Offices, Edinburgh.

Class Fees.—For each course of lectures (anatomy, ophthalmic medicine and surgery, aural surgery, diseases of throat and nose and mental diseases excepted): first session, £2, 2s.; second session (in Anderson's College), £1, 1s.; afterwards free. For practical classes (except anatomy), viz., chemistry, botany, zoology, physiology, pharmacy, operative surgery: first session, £2, 2s.; second session, £2, 2s.

Reduced joint fees in zoology and in botany, for lectures and practical class when taken in same summer session, £3, 3s.; for either course separately, £2, 2s.

Anatomy Class Fees. — Winter — first session (including practical

anatomy), £4, 4s.; second session (including practical anatomy), £4, 4s.; third session, £2, 2s.

Summer—lectures and practical anatomy, £2, 12s. 6d.; lectures alone, £1, 11s. 6d.; practical anatomy alone, £1, 11s. 6d.; osteology and practical anatomy, £2, 12s. 6d.; osteology alone, £1, 11s. 6d.; practical anatomy alone, £1, 11s. 6d.

Ophthalmic Medicine and Surgery (including hospital practice), *Aural Surgery, Diseases of Throat and Nose and Mental Diseases*, £1, 1s.

Matriculation Fee.—Winter, 10s.; for summer session only, 5s.

ABERDEEN UNIVERSITY.

The course of study for the degree of M.B., Ch.B. extends over five years, of which two at least must be spent in the University of Aberdeen.

The curriculum is the same as in the other Scottish Universities as far as relates to attendance on University classes, to clinical study at a General Hospital, to attendance on courses of Clinical Surgery, Clinical Medicine, Mental Diseases, and Practical Pharmacy, to instruction in Vaccination, to attendance on Cases of Labour, and to the practice of a Dispensary.

The candidate must also, before admission to the final examination, produce the following certificates:—

(1) That he has acted as Clerk in the Medical and Dresser in the Surgical Wards of a Public Hospital, each for a period equivalent to one Winter Session.

(2) That he has been present at not fewer than twenty-five post-mortem examinations at a Hospital or Dispensary, some of which he must have taken part in performing.

(3) That he has attended for at least three months the practice of a General Fever Hospital with not fewer than forty beds.

(4) That he has attended for at least three months a course of clinical instruction in the Diseases of Children.

(5) That he has attended for at least three months the Ophthalmological practice of a Hospital or Dispensary, where special provision is made for giving instruction.

Certificates for these various classes and courses must attest not only regular attendance, but also due performance of the work.

There is no prescribed order of study, but a scheme, representing the minimum curriculum, has been drawn up for the guidance of students, and is printed in the Calendar.

THE FOLLOWING ARE THE CLASSES IN THE MEDICAL FACULTY :—

WINTER SESSION.

Zoology—Professor John Arthur Thomson, M.A.
Chemistry—Professor Japp, M.A., LL.D., F.R.S.
Anatomy—Professor Reid, M.D., F.R.C.S.
Practical Anatomy—Professor Reid and Assistants.
Physiology (*Syst. and Pract.*)—Professor MacWilliam, M.D.
Materia Medica—Professor Cash, M.D., F.R.S.
Pathology (*Syst. and Pract.*)—Professor George Dean, M.B., C.M.
Surgery—Professor John Marnoch, M.A., M.B., C.M.
Medicine—Professor Finlay, B.A., M.D., F.R.C.P.
Midwifery and Diseases of Women and Children—Professor Stephenson, M.D., F.R.C.S.

SUMMER SESSION.

Botany—Professor Trail, M.A., M.D., F.R.S.
Practical Botany—Professor Trail.
Zoology—Professor Thomson.
Practical Zoology—Professor Thomson.
Physics—Professor Niven, M.A., D.Sc., F.R.S.
Practical Chemistry—Professor Japp and Assistants.
Practical Anatomy—Professor Reid and Assistants.
Practical Materia Medica and Pharmacy—Professor Cash and Assistants.
Physiology (*Syst. and Pract.*)—Professor MacWilliam.
Forensic Medicine—Professor Hay, M.D.
Practical Hygiene and Forensic Medicine—Professor Hay.
Pathology (*Syst. and Pract.*)—Professor Dean.
Practical Midwifery and Gynæcology and Clinical Diseases of Children—Professor Stephenson.

Systematic and Practical Pathology, and Systematic and Practical Physiology respectively are now taught as part of one continuous course, occupying a whole academic year, *i.e.* a summer and a winter session.

There are Assistants to the Professors in the Medical Faculty appointed annually, two in the department of Anatomy, Physiology, Materia Medica and Chemistry, and one in each of the other departments.

Clinical Medicine and Clinical Surgery are taught by the Physicians and Surgeons of the Royal Infirmary.

The following are recognised as Lecturers :—

Lecturer on Mental Diseases	.	Wm. Reid, M.D.
,, Ophthalmology	.	C. H. Usher, M.B., B.S., F.R.C.S. A. Rudolph Galloway, M.A., M.B., C.M.

Lecturer on	Vaccination . .	T. Fraser, M.A., M.B., Ch.B.
„	Skin Diseases . .	J. F. Christie, M.A., M.B., C.M.
„	Diseases of Ear, Throat and Nose . .	J. Mackenzie Booth, M.D., C.M. H. Peterkin, M.B.
„	Medical Electricity .	J. R. Levack, M.B., C.M.
„	Anæsthetics . .	J. J. Y. Dalgarno, M.B., C.M. D. W. Geddie, M.B., C.M.

All the University Classes are held at Marischal College.

Tutorial Classes are held in connection with most of the Systematic Courses, and practical instruction is given in the fully-equipped Laboratories connected with the several departments.

Graduates or others desirous of engaging in special study or research may be allowed by the Senatus to work in any of the Laboratories on payment of the usual matriculation fee.

General clinical instruction is obtained in the following Medical Institutions:—

The Royal Infirmary of Aberdeen.

This General Hospital, situated about seven minutes' walk from Marischal College, has been recently constructed on the most modern principles, and is fully equipped with all the requirements for medical work and teaching. It accommodates upwards of two hundred patients: the number of patients admitted during the year 1908 was 3228, and the number of out-patients treated during the same period was 17,657.

Six resident medical officers are appointed annually, three in May and three in September, to hold office for twelve months. Salary, £26, 5s. with board.

Fees.—Perpetual fee to hospital practice, £6, or first year, £3, 10s., second year, £3, afterwards free; clerkship in medicine, £1, 1s.; dressership in surgery, £1, 1s.; pathological demonstrations, £2, 2s. (Special courses of lectures are charged for.)

The Royal Hospital for Sick Children

Is situated about five minutes' walk from Marischal College, and accommodates over 80 patients. The number of patients admitted in 1908 was 747, and the number of out-patients treated 1790. No infectious disease except diphtheria is treated. Each student must act as clerk for six weeks in the medical and surgical wards respectively.

There is one qualified house physician and surgeon (resident) who holds office for six months. Salary at the rate of £25 per annum.

Fee for hospital practice, £2, 2s. first year; subsequent years, £1, 1s.

The Royal Asylum

Is about fifteen minutes' walk from Marischal College. It accommodates over 950 patients, and has been recently fitted up with a fully-equipped hospital and a laboratory.

The senior physician is recognised by the University as lecturer on mental diseases, and delivers a qualifying course of lectures.

The City (Fever) Hospital

Is about ten minutes' walk from Marischal College, and accommodates 100 patients.

Senior students are admitted for instruction in fevers twice a week under the visiting physician (who is the Medical Officer of Health for the City) and his assistant. Fee, £1, 1s.

General Dispensary, Maternity Hospital and Vaccine Institution.

This is about five minutes' walk from Marischal College.

The total number of cases treated during 1908 was 13,877, and the number of patients treated at their own homes 3754. There were 396 midwifery cases.

Fees.—Perpetual fee, £3, 3s.; vaccination certificate and instruction, £1, 1s.; for special courses, *v. supra.*

Ophthalmic Institution.

This Institution is situated about three minutes' walk from Marischal College. The surgeon in charge is recognised by the University as a lecturer on ophthalmology.

During 1903, 50 in-patients and 3680 out-patients were treated.

PROFESSIONAL EXAMINATIONS.

There are four examinations: the subjects and regulations of these are common to the Universities of Aberdeen, Glasgow and St. Andrews.

Degree of M.D.

The regulations with regard to the age and other qualifications of the candidate are similar to those in the other Scottish Universities. He must submit a thesis written by himself upon any medical subject, and pass an examination in Clinical Medicine and in such Special Departments of Medicine as he may select.

Degree of Ch.M.

Each candidate must be not less than twenty-four years of age, and must hold the degree of M.B., Ch.B. of the University. He must

produce a certificate of having been engaged for at least one year in attendance in the surgical wards of a Hospital, or in scientific research, or in the naval and military services, or for two years in practice other than practice restricted to medicine. He must present a thesis on a surgical subject and pass an examination on Clinical Surgery, Surgical Anatomy, and Operations on the Dead Body.

Diploma in Public Health (D.P.H.).

The diploma is conferred, after special instruction and examination, on any one who has been at least twelve months a graduate in medicine of a University in the United Kingdom; if not a graduate of Aberdeen University, the candidate must attend a course of instruction in this University in one or more subjects embraced in the examination for the diploma.

Each candidate must have attended a course of instruction in Public Health.

The qualifying post-graduate instruction embraces—

(α) Regular attendance, for three months, at a hospital for infectious diseases, at which opportunities are afforded for the study of methods of administration.

(β) Daily association for a period of six months (of which at least three months must be distinct from the period of laboratory instruction) in the duty, routine and special, of Public Health Administration, under the supervision of a recognised Medical Officer of Health.

(γ) Practical instruction, for at least six months, in laboratory work, which includes examination of water, air, soil and foods, and the study of bacteriology, disinfection, ventilation, water supply and sewerage, and the framing of reports of analysis. The laboratory attendance must extend over at least fifteen hours a week.

The qualifying courses of laboratory instruction in Aberdeen University are given in the Public Health Laboratory (Fee, £6, 6s.), and the Bacteriological Laboratory (Fee £4, 4s.).

Instruction is given in the Drawing and Interpretation of Plans (Fee, £1, 1s.).

The diploma is conferred after an examination in March and July of each year.

The examination is written, oral and practical, and is divided into two parts.

Part I. embraces the following subjects in their application to Public Health :—

(α) Physics, Engineering and Meteorology.

(β) Chemistry, Microscopy and Bacteriology.

Part II. embraces—

(α) General Hygiene.

(β) Sanitary Law and Vital Statistics.

Part I. may be taken alone, or both parts together.

The written examinations occupy two days, and the oral and laboratory, and outdoor examinations three to four days.

Candidates must send in their names and pay the fees a fortnight before the examination. Examination Fee is five guineas. Re-examination fee one guinea.

SUMMARY OF FEES.

I. University Fees.

(α) Preliminary Examination (each occasion)			£0	10	6
(β) Matriculation—For whole year			1	1	0
For Summer Session			0	10	6
(γ) Class Fees—					
Each Systematic Course—For Winter or Full Course			4	4	0
Each subsequent attendance			3	3	0
For Summer or Half-Course			3	3	0
Each subsequent attendance			3	3	0
Each Practical Course and subsequent attendance			3	3	0
Except { Practical Anatomy in Summer			2	2	0
Except { Practical Midwifery			2	2	0
(δ) Degree Fees—For M.B., Ch.B.—					
1st Professional Exam.	£5	5 0			
2nd „ „	5	5 0			
3rd „ „	5	5 0			
4th „ „	7	7 0			
			23	2	0
Re-examination Fee for not more than two subjects			1	1	0
„ for each additional subject			0	10	6
For M.D.			10	10	0
For Ch.M.			10	10	0
Re-examination Fee			2	2	0

II. Non-University Fees.

Royal Infirmary—Perpetual Fee	6	0	0
Children's Hospital	2	2	0
Dispensary—Perpetual Fee	3	3	0

City (Fever) Hospital		£1	1	0
Lectures on clinical medicine—Winter Session		4	4	0
,, ,, ,, Summer ,,		3	3	0
,, clinical surgery—Winter Session		4	4	0
,, ,, ,, Summer ,,		3	3	0
Clerkship at Royal Infirmary		1	1	0
Dressership ,, ,,		1	1	0
Course of Lectures on { Mental diseases; Diseases of eye; Diseases of ear and throat; Diseases of skin; Clinical Gynæcology; Medical electricity }	Each	2	2	0
Instruction in { Anæsthetics; Dental surgery; Post-mortem room }				
Instruction in vaccination		1	1	0

The cost of matriculation, class and hospital Fees for the whole curriculum, exclusive of fees for degrees, is usually about £120.

UNIVERSITY OF ST. ANDREWS.

The medical degrees are the same as those of Glasgow and Aberdeen Universities, and they are granted under similar conditions. The graduation fees for the degree of M.B., Ch.B. amount to twenty-two guineas, and for M.D. or Ch.M. ten guineas.

United College, St. Andrews, affords considerable facilities to students beginning a medical course, especially if they are willing to combine it with a preliminary two years of study for an Arts or Science degree. Under the New Regulations, which make it possible to study botany, zoology, chemistry, and physics as part of the course for an M.A. degree, the medical student can, during the early years of his medical course, hold some of the many bursaries or scholarships which the University of St. Andrews has to offer. For women, the large number of Taylour Thomson bursaries makes the course at St. Andrews specially advantageous. The cost of rooms and living is considerably under that in the larger towns. For women there is an excellent residential hall, and other students may attend the common dinners in the Union. The medical course in St. Andrews extends over two years, and embraces all the subjects (except materia medica) of the first two professional examinations. The other subjects must be taken at the Conjoint School of Medicine, Dundee, or elsewhere. There are special buildings for the Medical School.

The Conjoint School of Medicine, University College, Dundee, supplies a complete course of medical study, whether the student graduate at the University (St. Andrews) or not. Several bursaries are offered for competition among the medical students. Large and commodious new buildings for this medical school, with well-equipped laboratories and dissecting-room, afford ample scope for study. Besides the supervision of individual students which larger schools cannot offer, there are unrivalled opportunities for clinical and out-patient work in the Royal Infirmary.

This Institution is provided with over 300 beds, including special wards for obstetrics, gynæcology, children's diseases, ophthalmology, diseases of the skin, and ear, throat and nose.

In addition to this, a large new building, primarily intended for those suffering from cancer not past the operative stage, provides an additional 120 beds and quarters for special research, with an electrical department. There is a large outdoor maternity department, and there are dispensaries which are largely attended in the various districts of the city.

Hospital Fees—Surgical and Medical, £3, 3s. yearly; £1, 1s. quarterly; Perpetual Ticket, £10, or in instalments £10, 10s.; Obstetric, £2, 2s.

The large asylum at Liff provides material for instruction in mental diseases, and the epidemic hospital for that in fevers. There is also the Royal Victoria Hospital, where patients suffering from incurable diseases can be visited.

UNITED COLLEGE, ST. ANDREWS.

Professors and Lecturers.

Physics— Professor Butler.
Chemistry— Professor Irvine.
Zoology— Professor Mackintosh.
Botany Lecturer—
Mr. R. A. Robertson.
Physiology, Histology and Physiological Chemistry—
Professor Herring.
Anatomy and Embryology—
Professor Musgrove.

UNIVERSITY COLLEGE, DUNDEE.

Professors and Lecturers.

Physics— Professor Peddie.
Chemistry—Professor Hugh Marshall.

Zoology— Professor D'Arcy W. Thompson, C.B.
Botany— Professor Geddes.
Physiology—Professor Waymouth Reid.
Anatomy— Principal Yule Mackay.
Surgery, Systematic and Operative—
Professor MacEwan.
Surgery, Clinical—
Professor MacEwan.
Mr. D. M. Greig.
Medicine, Systematic—
Professor Stalker.
Medicine, Clinical—
Professor Stalker.
Dr. Mackie Whyte.
Materia Medica—
Professor Marshall.
Pathology—
Professor Sutherland.
Midwifery and Diseases of Women—
Professor Kynoch.
Midwifery and Diseases of Women, Clinical—
Professor Kynoch.
Dr. R. C. Buist.
Forensic Medicine—
C. Templeman, M.D., D.Sc., M.O.H.
Ophthalmology—
A. M'Gillivray, M.D.
Diseases of Children—
Mr. D. M. Greig.
Dr. J. S. Y. Rogers.
Diseases of the Skin—
Dr. W. E. Foggie.
Mental Diseases—
J. Rorie, M.D.
W. T. Mackenzie, M.D.
Diseases of Ear and Throat—
G. T. Guild, M.B.
Vaccination—
R. C. Buist, M.D.

QUALIFICATIONS GIVEN BY THE SCOTTISH COLLEGES.

The Royal College of Physicians of Edinburgh, the Royal College of Surgeons of Edinburgh, and the Faculty of Physicians and Surgeons of Glasgow, conjointly confer the Triple Qualification (L.R.C.P.E.,

L.R.C.S.E., L.F.P.S.G.). Female candidates are admitted to the examinations for this qualification.

Preliminary Examination.—This examination must be passed before the student commences professional study. It may be passed before any of the Boards recognised by the General Medical Council, and enumerated in the Regulations of the Colleges. The Educational Institute of Scotland conducts a qualifying Preliminary examination for medical students, in Edinburgh and Glasgow, on behalf of the Colleges. This examination embraces English, Latin, Mathematics, and either Greek, French, German, Italian, or other modern language. All the subjects must be passed at one time. Calendar, containing examination papers, can be had from S. M. Murray, Esq., 34 North Bridge, Edinburgh. Price 1s.

Professional Education.—The curriculum must extend over five years. Graduates in Arts or Science of any recognised University who have spent a year in the study of Physics, Chemistry, and Biology, and have passed an examination in these subjects for the degrees in question, are exempted from the first year of study. The fifth year of study should be devoted to clinical work in one or more recognised Hospitals or Dispensaries, and to the study of special diseases. For information regarding the payment of class fees by the Carnegie Trust, *vide*, p. 344.

Order of Study which is Recommended.

First Summer.— Physics and Elementary Biology.

First Winter.— Five months' course in Chemistry and Anatomy; three months' course in Practical Chemistry; Practical Anatomy.

Second Summer.—Practical Anatomy; Practical Physiology.

Second Winter.— Practical Anatomy; Physiology—Five months' course.

Third Summer.— Three months' course in Pathology, Materia Medica, and Practical Materia Medica; Surgical Hospital Practice.

Third Winter.— Six months' course in Surgery and Clinical Surgery; Attendance at Surgical Wards; Pathology.

Fourth Summer.—Three months' course in Midwifery and Gynæcology, in Medical Jurisprudence and Public Health, and in Clinical Surgery; Hospital Practice.

Fourth Winter.— Six months' course in Medicine and Clinical Medicine; Hospital Practice.

Fifth Summer.— Three months at Clinical Medicine; Hospital; Insanity; Diseases of Children; Diseases of Eye.

Practical Midwifery—Personal attendance on twelve cases under the supervision of a medical practitioner, *or* three months' attendance at a Lying-in Hospital and personal attendance on six cases.

Fifth Winter.— Hospital Practice; Fevers; Dispensary; Vaccination; Skin Diseases; Ear and Throat Diseases; Eye Diseases; Operative Surgery.

Professional Examinations.—Four of these are held during the curriculum. Each is held quarterly in Edinburgh and twice a year in Glasgow. Candidates may go up for all the subjects of the first Professional examination at once, or may enter for and pass in any division of subjects. A higher standard is expected, however, from candidates entering for such divisions. Candidates are advised to enter for the entire examination; this is especially the case in the final examination.

First Examination.—Physics, Chemistry and Elementary Biology. This should be passed before the beginning of the second winter session.

Second Examination.—Anatomy, Physiology, including Histology. This should be passed at the end of the second year of study.

Third Examination.—Pathology, Materia Medica and Pharmacy. This should be taken at the end of the third year.

Final Examination.—Can only be taken at the end of the fifth year. The candidate must have attained the age of twenty-one.

It includes—

1. Medicine, Therapeutics, Medical Anatomy, Clinical Medicine.
2. Surgery, Surgical Anatomy, Clinical Surgery, Diseases of the Eye.
3. Midwifery and Diseases of Women and Newborn Children.
4. Medical Jurisprudence and Public Health.

(May be taken at any time after the Third Examination).

Fees for Professional Examinations.

For each of the first three, £5; for the final, £15. The minimum total expense, inclusive of fees for classes and examinations, amounts to £115.

Diploma in Public Health of the Royal Colleges.

The Diploma is granted by the Triple Qualification Board.

1. Every candidate for examination must have held a registrable medical qualification for one year.

2. After obtaining such qualification he must have attended during

six months a recognised Laboratory in which Chemistry, Bacteriology, and the Pathology of the Diseases of Animals transmissible to man are taught; and the certificate must show that the candidate has conducted analyses of air, water, sewage and foods.

3. After obtaining a medical qualification he must during six months have been engaged in acquiring a practical knowledge of the duties of Public Health Administration, under the supervision of—

(*a*) In England or Wales, the Medical Officer of Health of a County or single sanitary District having a population of not less than 50,000, or a Medical Officer of Health devoting his whole time to Public Health work; or

(*b*) In Scotland or Ireland the Medical Officer of Health of a County or District or Districts with a population of not less than 30,000; or

(*c*) A Medical Officer of Health who is also a teacher in the Department of Public Health in a recognised medical school.

(*d*) A Sanitary Staff Officer of the Royal Army Medical Corps having charge of an Army Corps, District or Command, recognised for the purpose by the General Medical Council.

4. After obtaining a medical qualification he must have attended for three months the practice of a Hospital for Infectious Diseases.

There are *Two Examinations*. The first includes—(*a*) Laboratory work, with Chemistry and Bacteriology; (*b*) Physics; (*c*) Meteorology.

The Second Examination embraces—(*a*) Report on premises visited; (*b*) Examination at Fever Hospital; (*c*) Examination at Public Abattoir; (*d*) Epidemiology and Endemiology; (*e*) Vital Statistics and Sanitary Law; (*f*) Practical Sanitation.

Each examination is held bi-annually, in October and May. The fee for each is £6, 6s.; for re-examination, £3, 3s. Fees and applications to be lodged with Mr. James Robertson, 54 George Square, Edinburgh; or with Mr. Alex. Duncan, LL.D., 242 St. Vincent Street, Glasgow.

Membership and Fellowship of the Royal College of Physicians, Edinburgh.

Every applicant for the *Membership* must possess a recognised qualification, and be not less than twenty-four years of age. He must pass an examination on Medicine and Therapeutics, on Clinical Medicine, and on some special Department of Medicine, such as Psychological Medicine, Pathology, Medical Jurisprudence, Public Health, Midwifery, Gynæcology, Neurology, Diseases of Children, Tropical Medicine, &c. The Membership is conferred by election.

The fee for the Membership is thirty-five guineas, except the applicant be a Licentiate of the College, when it is twenty guineas.

Members of not less than three years' standing may be raised by election to the *Fellowship*, the fee being thirty-eight guineas, exclusive of Stamp Duty of £25.

Fellowship of the Royal College of Surgeons, Edinburgh.

Every candidate must be twenty-five years of age, and must have been engaged for two years in the practice of his profession, after having obtained a recognised qualification in Surgery. The petition for examination must be signed by two Fellows—a proposer and seconder.

The candidate must pass an examination on Surgery, Surgical Anatomy, Clinical Surgery, and one optional subject, for example, Ophthalmology, Aural, Nasal and Laryngeal Surgery, Dental, Surgery, Advanced Anatomy or Physiology, Surgical Pathology, Operative Surgery and Morbid Anatomy, Midwifery, Gynæcology, Pathology and Bacteriology, Medical Jurisprudence and Public Health.

The fees amount to £45. If the candidate be a Licentiate of the College the fee is £30. Further particulars may be obtained from the Clerk to the College, 54 George Square, Edinburgh.

Fellowship of the Faculty of Physicians and Surgeons of Glasgow.

Every candidate must have been qualified for two years, and be aged twenty-four. Admission to the Fellowship is by examination and subsequent election. The candidate is examined on either (*a*) Medicine (including Clinical Medicine, Medical Pathology, and Therapeutics), or (*b*) Surgery (including Clinical Surgery, Operative Surgery, Surgical Anatomy, and Surgical Pathology); and on one optional subject — Anatomy, Physiology, Pathology, Midwifery, Diseases of Women, Medical Jurisprudence, Ophthalmic Surgery, Aural, Laryngeal and Nasal Surgery, Dental Surgery, State Medicine, Psychological Medicine or Dermatology.

The fee is £30, except the candidate be a Licentiate of the Faculty, when it is £15.

MEDICAL EDUCATION OF WOMEN IN EDINBURGH.

School of Medicine for Women, Surgeons' Hall.

The courses of instruction given in this School qualify for graduation in Medicine. The curriculum and class fees are the same as for male students proceeding to the University Degree or College Qualification respectively. Clinical tuition is provided in the Royal Infirmary and Sick Children's Hospital.

The prospectus of the College, and any information regarding the medical education of women in Edinburgh, may be obtained from the Secretary, Dean's Office, School of Medicine for Women, Surgeons' Hall, Edinburgh.

POST-GRADUATION STUDY.

The different University Laboratories provide facilities for research work. In most cases no fees are charged, but those engaged in research work are expected to defray the expense of materials. The Laboratory of the Royal College of Physicians of Edinburgh is splendidly equipped for the carrying out of all branches of medical research. It is available for research work to Members and Fellows of the Royal Colleges of Edinburgh and to other applicants approved by the Council of the Royal College of Physicians. No fees are charged, and the ordinary reagents, &c., are provided. By arrangement with the Superintendent, workers may have the assistance of members of the Laboratory Staff. Special post-graduate courses may be arranged.

EDINBURGH POST-GRADUATE VACATION COURSES IN MEDICINE.

These classes are arranged by a Committee appointed by the University and the School of Medicine of the Royal Colleges. The chief course is held in September.

The composite fee for the Four Weeks' Course is Five Guineas, or Three Guineas for either the first or second fortnight. A special additional fee of One Guinea is charged for each of the following practical classes, in which the accommodation is limited, viz. :— Disease of the Blood (elementary and advanced); Bacteriology (elementary and advanced); Gastric Methods; Pathological Methods; Ophthalmoscopy; Errors of Refraction; Diseases of the Ear, Nose and Throat; X-Ray and Electrical Work.

A class of Operative Surgery, limited to twenty, may be attended. The fee is Five Guineas in addition to the composite fee.

The other classes include :—Applied Anatomy, Anæsthetics, Modern Bacteriological Research in relation to Practical Medicine, Dietetics, Diseases of the Heart, Infant Feeding, Pathological Methods, Surgical Pathology, Examination of the Urine, as well as Clinical Lectures and Demonstrations in Medicine, Surgery and all the special departments.

A number of elementary classes and demonstrations of methods are held in August. The fee in most instances is one guinea for each class.

Those intending to take the classes are requested to notify the

Secretary, The Faculty Office, University New Buildings, from whom a syllabus may be obtained.

In addition to these courses the classes throughout the year on bacteriology, diseases of the blood, diseases of the tropics, neurology, &c., are usually attended by a considerable number of graduates.

GLASGOW ROYAL INFIRMARY AUTUMN POST-GRADUATE CLASSES.

These include Demonstrations on Diseases and Injuries of the Eye, Surgical Diseases of the Kidneys and Bladder, Clinical Medicine, Clinical Surgery, Diseases of the Ear, Diseases of Throat and Nose, Hæmatology, Gynæcology, Practical Pathology and Bacteriology.

Those desirous of attending any of the classes are requested to communicate with Dr. Thom, Superintendent, Royal Infirmary, from whom a syllabus may be obtained.

THE ROYAL NAVY MEDICAL SERVICE.

A CANDIDATE must be between 21 and 28 years of age. He must declare: (1) his age, and date and place of birth; (2) that he is of pure European descent, the son either of natural-born British subjects or of parents naturalised in the United Kingdom; (3) that he labours under no mental or constitutional weakness; (4) that he is ready to engage for general service at home or abroad; (5) that he is registered under the Medical Acts as duly qualified professionally, and what diplomas, &c., he holds. Copies of the Regulations for the entry of candidates for commissions will be furnished on application to the Medical Director-General, Admiralty, 18 Victoria Street, London, S.W.

The entrance examination consists of two parts. Part I.—*Compulsory* (*a*) Medicine (including Materia Medica, Therapeutics and Hygiene), 1200 marks; (*b*) Surgery and Surgical Anatomy, 1200 marks. A competent knowledge of Operative Surgery is essential. Part II.—*Voluntary*—consisting of two divisions: (*a*) French and German (300 marks each); (*b*) Natural Sciences—not more than two of the following subjects—Zoology, Botany, Chemistry, Physiology, Geology and Physical Geography (300 marks each).

Successful candidates, immediately after passing this examination, will receive commissions as surgeons in the Royal Navy, and will undergo a course of practical instruction in Naval Hygiene, the diseases of warm climates, &c., at Haslar Hospital.

Full Pay (yearly).—Surgeon (on entry), £255, 10s.; after four years' full-pay service, £310, 5s.; after eight years' full-pay service, or on promotion to Staff-Surgeon, £363; after twelve years service, £438;

Fleet-surgeons (on promotion), £492, 15s.; after four years' full-pay service in that rank, £547, 10s.; after eight years' full-pay service, £602, 5s.; after twelve years' service, £657; Deputy Inspector-General, £766, 10s.; Inspector-General, £1300.

Allowances.—The senior medical officer of ships bearing the flag of flag officers commanding foreign stations and the Channel receives an allowance of 5s. a day. An allowance of 2s. 6d. a day may be granted to the senior medical officer of ships bearing the flag of flag officers not commanding stations or fleets and to ships flying the broad pennant of commodores. Medical officers conducting the course of instruction at Haslar Hospital receive the following allowances:—The two senior officers employed on this duty, £150 a year each; the junior officer assisting, £50 a year; the junior officer instructing the sick berth staff, £50 a year. The following charge allowances may be granted to medical officers in charge of hospital ships:—If above the rank of Fleet-surgeons, 5s. a day; if of the rank of Fleet-surgeon or junior, 3s. 6d. a day. Hospital allowances for naval medical officers at home and abroad, in lieu of provisions for themselves and servants, and for fuel and lights, are as follows:—Deputy Inspector-Generals, at home, £67; abroad, £112; Fleet or Staff-surgeons, at home, £53; abroad, £112; Surgeons, at home, £39; abroad, £108.

Half Pay (*per diem*).—Surgeons under two years' full-pay service, 6s.; after two years' full-pay service, 7s.; after four years' full-pay service, 8s.; after six years, 9s.; after eight years, 10s.; after ten years, 11s. Staff-surgeon on promotion, 12s.; after fourteen years, 13s.; after sixteen years, and on promotion to Fleet-surgeon, 14s.; after eighteen years, 15s.; after twenty years, 17s.; after twenty-two years, 18s.; and after twenty-four years, 20s. Deputy Inspector-General on promotion, 25s.; after two years' full-pay service in rank, 27s.; after four years, 29s. Inspector-General, 38s.

Every medical officer will be required to undergo a post-graduate course of three months' duration at a metropolitan hospital once in every eight years. While carrying out this course, he will be borne on a ship's book for full pay and will be granted lodging and provision allowances and travelling expenses. The fees for each course (not exceeding £25) will be paid by the Admiralty. The medical officer will be required to produce separate certificates of efficient attendance in (1) the medical and surgical practice of the hospital; (2) a course of operative surgery on the dead body; (3) a course of bacteriology; (4) a course of ophthalmic surgery, particular attention being paid to the diagnosis of errors of refraction; (5) a practical course of skiagraphy.

ROYAL ARMY MEDICAL CORPS.

The conditions of service are as follows:—

A candidate for a commission must be 21 years of age, and not over 28 years of age, at the date of commencement of the entrance examination. He must possess a registrable qualification to practise. Regulations, forms of application, and declaration may be obtained on application to the Director-General, Army Medical Service, 68 Victoria Street, London, S.W. The Dean of the candidate's medical school will be requested to render a confidential report as to the candidate's character, conduct, professional ability and fitness, and to this report special importance will be attached. The candidate may subsequently be allowed to compete for a commission, having been previously examined as to physical fitness by a Medical Board.

The *Entrance Examination* (held twice a year, usually in January and July) is of a clinical and practical character, partly written, and partly oral, marks being allotted under the following scheme:—

	Maximum Marks.
MEDICINE (written).	
A. Examination and report upon a medical case in the wards of a hospital	125
B. Commentary upon a case in medicine	125
MEDICINE (oral).	
A. Clinical cases; clinical pathology	75
B. Morbid anatomy and morbid histology	75
SURGERY (written).	
A. Examination and report upon a surgical case in the wards of a hospital	125
B. Commentary upon a case in surgery	125
SURGERY (oral).	
A. Clinical cases, including diseases of the eye; surgical instruments and appliances	75
B. Operative surgery and surgical anatomy	75
Total marks	800

Having gained a place in this entrance examination, the successful candidates will undergo two months' instruction in hygiene and bacteriology, after which they will be examined in these subjects. On completion of this course, lieutenants on probation will proceed to the Depot of the Royal Army Medical Corps at Aldershot for a three months' course of instruction in the technical duties of the Corps, and at the end of the course will be examined in the subjects taught.

Examinations for Promotion.

Lieutenant before promotion to Captain (for Lieutenants appointed after 31st March 1901). This examination may be taken at any time after completing eighteen months' service. The subjects of the examination are: (1) Regimental duties; (2) drill; (3) military law; (4) duties and accounts connected with military hospitals and their supplies; (5) other duties of executive medical officers.

Captains before promotion to Majors (for Captains promoted to that rank after 27th July 1895). This examination may be taken at any time after completing five years' service, after terminating a period of special study. The subjects of the examination are: medicine, including specific fevers, surgery, including skiagraphy, hygiene, bacteriology, and tropical diseases, and one special subject from the subjoined list, to which additions may from time to time be made—bacteriology (including the preparation of antitoxins), dental surgery, dermatology, midwifery and gynæcology, advanced operative surgery, ophthalmology, otology, including laryngology, and rhinology, psychological medicine, State medicine.

Majors for promotion to Lieutenant-Colonel (for Majors promoted to that rank after 31st March 1895). This examination may be taken at any time after three years in the rank of Major. The subjects of this examination are: (1) Military law; (2) army medical organisation; (3) sanitation of towns, camps, transports, &c., epidemiology and the management of epidemics; (4) the laws and customs of war in relation to the sick and wounded; (5) one special subject, *e.g.* (*a*) medical history of important campaigns; (*b*) a general knowledge of the army medical services of other powers.

Pay.

At Headquarters.	Inclusive of all allowances except field and travelling allowances. Yearly.
Director-General	£2000
Deputy Director-General	1500
Assistant Director-General	850
Deputy Assistant Director-General	750

At other Stations.	Exclusive of allowances. Daily. £	*s.*	*d.*
Surgeon-General	3	0	0
Colonel	2	0	0
Lieutenant-Colonel	1	10	0
„ „ specially selected for increased pay after at least 8 years' service abroad	1	15	0

	Exclusive of Allowances. Daily. £	s.	d.
Major	1	3	6
Major after 3 years' service as such	1	6	0
Captain	0	15	6
„ after 7 years' total full-pay service	0	17	0
„ „ 10 „ „ „ „	1	1	0
Lieutenant on probation and Lieutenant	0	14	0

Adjutant of the Royal Army Medical Corps (Volunteer)—the pay of his rank.

Additional Pay.

Officer not serving on the Headquarters' Staff appointed a member of the Advisory Board	£150 a year.
Officer serving as Secretary of the Advisory Board and Nursing Staff	£100 a year.
Officer under the rank of Lieutenant-Colonel holding an appointment as Specialist	2s 6d. daily.
Quarter-Master in charge of Medical Stores at Woolwich	2s. 6d. daily.

Charge Pay.

	Daily. s.	d.
(*a*) Officer in charge of a general or other hospital, or of a division of a general hospital—		
If in charge of at least 50 beds	2	6
„ „ „ 100 „	5	0
„ „ „ 200 „	7	6
„ „ „ 300 „	10	0
(*b*) Officer in command of the Depot, Royal Army Medical Corps	5	0

Retired Pay.

	Yearly.
Director-General (after three years' service in the appointment, and 30 years' service)	£1125

	Daily. £	s.	d.
Surgeon-General	2	0	0
Colonel	1	15	0
Lieutenant-Colonel, or Surgeon-Lieutenant-Colonel of the Household Troops—			
After 20 years' service	1	0	0
„ 25 „ „	1	2	6
„ 30 „ „	1	5	0

	£ s. d.
Lieutenant-Colonel, after having been in receipt of the increased pay (5s. a day) for 3 years; or Brigade-Surgeon - Lieutenant - Colonel of the Household Troops—	
Under 30 years' service . . .	1 7 6
After 30 „ „ . . .	1 10 0
Major, or Surgeon-Major of the Household Troops—	
After 20 years' service . . .	1 0 0
After 25 years' service, if his service reckoning for promotion is insufficient to qualify him for promotion to the rank of Lieutenant-Colonel	1 2 6
	Gratuity.
Major or Captain—	
After 5 years' service in the rank of Captain .	£1000
After 10 years' service, if the officer was commissioned before the date of the Warrant	1250
After 3 years' service in the rank of Major .	1800
After 6 years' service in the rank of Major .	2500
Surgeon-Lieutenant-Colonel or Surgeon-Major of the Household Troops—	
After 15 years' service . . .	1800
„ 18 „ „ . . .	2500
Retirement shall be compulsory at the following ages:—	
Surgeon-General	60
Colonel, promoted to the rank on or after the date of the Warrant . . .	57
Colonel, promoted to the rank before the date of the Warrant	60
Other Officers	55

INDIAN MEDICAL SERVICE.

CANDIDATES must be natural-born subjects of His Majesty, of European or East Indian descent, between 21 and 28 years of age at the date of the examination, of sound bodily health, and in the opinion of the Secretary of State for India in Council, in all respects suitable to hold commissions in the Indian Medical Service. The candidate must show proof of age, a recommendation to the effect that he is of regular and steady habits, a certificate of moral character, certificate of registration under the Medical Acts, a certificate of having attended a course of instruction for not less than three months at an ophthalmic hospital, or the ophthalmic department of a general hospital.

The physical fitness of each candidate will be determined by a Board of Medical Officers.

On proving possession of the foregoing qualifications, the candidate will be examined in the following subjects :—

	Maximum Marks obtainable.
1. Medicine, including Therapeutics . .	1200
2. Surgery, including Diseases of the Eye . .	1200
3. Applied Anatomy and Physiology . .	600
4. Pathology and Bacteriology . . .	900
5. Midwifery and Diseases of Women and Children	600
6. Chemistry, Pharmacy, and *either* Botany *or* Zoology	600

After passing this examination, the successful candidate will be required to attend one entire course of practical instruction of not less than four months' duration at the Army Medical School and elsewhere in (1) Hygiene ; (2) Clinical and Military Medicine ; (3) Clinical and Military Surgery ; (4) Pathology of diseases and injuries incidental to military service. During the period of instruction each candidate will receive an allowance of 14s. per diem, with quarters, or with the usual allowances of a subaltern in lieu thereof. At the conclusion of the course, candidates will be required to pass an examination in the subjects taught during the course.

Pay and Promotion.

The rate of pay drawn by a Lieutenant previous to arrival in India is 14s. a day, but a Lieutenant who has been permitted by the Secretary of State to hold a hospital appointment will receive no pay while holding it.

A Lieutenant may be promoted to Captain on completion of three years' full-pay service from date of first commission ; but after completing eighteen months' service, and before promotion to the rank of Captain, he will be required to pass an examination in military law and military medical organisation, the result of which may affect his promotion.

A Captain is promoted to Major on completion of twelve years' full-pay service.

A Major is promoted to Lieutenant-Colonel on completion of twenty years' full-pay service.

All promotions from the rank of Lieutenant-Colonel to that of Colonel, and from the rank of Colonel to that of Surgeon-General are given by selection for ability and merit.

Pay.

The following are the monthly rates of Indian pay drawn by Officers of the Indian Medical Service from the date of their arrival in India :—

Rank.	Unemployed Pay.	Grade Pay.	Staff Pay.	In Officiating Medical Charge of a Regiment.	In Permanent Medical Charge of a Regiment.
	Rs.	Rs.	Rs.	Rs.	Rs.
Lieutenant . . .	420	350	150	425	500
Captain . . .	475	400	150	425	550
„ after 5 years' service .	475	450	150	545	600
„ after 7 years' service .	—	500	150	575	650
„ after 10 years' service .	—	550	150	625	700
Major	—	650	150	725	800
„ after 15 years' service .	—	750	150	825	900
Lieutenant-Colonel . .	—	900	350	1075	1250
„ „ after 25 years' service	—	900	400	1100	1300
Lieutenant-Colonel specially selected for increased pay .	—	1000	400	1200	1400

The principal administrative appointments are held by Colonels and Surgeon-Generals on the following consolidated salaries :—

Colonels, from Rs. 1800 to Rs. 2250 per mensem.			
Surgeon-General	2	@ Rs. 2200	„
„	2	@ Rs. 2500	„
„	1	@ Rs. 3000	„

Specialist pay at the rate of Rs. 60 a month is granted to officers below the rank of Lieutenant-Colonel who may be appointed to certain posts.

The salaries of other substantive medical appointments in the Civil and Military Departments are consolidated, and vary from Rs. 400 to Rs. 1800 per annum.

Qualified Officers of the Medical Service are also eligible for appointments in the Assay Department. The salaries of these appointments are from Rs. 600 to Rs. 2250 per mensem.

Officers are required to perform two years' regimental duty in India before they can be considered eligible for civil employment.

Except in the administrative grades, and in certain special appointments, medical officers are not debarred from taking private practice. No officer, however employed, can receive any staff allowance unless he has passed the examination in Hindustani known as the "Lower Standard."

Retiring Pensions and Half-Pay.

Officers of the Indian Medical Service may retire on the following scale of pension :—

	Per Annum.
After 30 years' service for pension . . .	£700
„ 25 „ „ „ . . .	500
„ 20 „ „ „ . . .	400
„ 17 „ „ „ . . .	300

All officers of the rank of Lieutenant-Colonel and Major are placed on the Retired List when they have attained the age of 55 years, and all Surgeon-Generals and Colonels when they have attained the age of 60 years.

Officers placed on temporary or permanent half-pay are granted the British rate of half-pay of their military rank as under:—

Rank.	Rates of Half-Pay. Per Diem.		Per Annum.		
	s.	*d.*	£	*s.*	*d.*
Lieutenant-Colonel . . .	11	0	200	15	0
Major	9	6	173	7	6
Captain	7	0	127	15	0
Lieutenant	3	0	54	15	0

MEDICAL APPOINTMENTS IN THE COLONIES.

Applicants for medical appointments in British Guiana, Jamaica, Trinidad and Tobago, Windward Islands, Leeward Islands, British Honduras, Fiji, Ceylon, Straits Settlements, Sierra Leone, Gambia, Gold Coast, Lagos, Northern and Southern Nigeria, Malay States, Hong Kong, Mauritius, Seychelles, Gibraltar, Cyprus, St. Helena and the Falkland Islands, must be between 23 and 30 years of age, must be doubly qualified, and preference will be shown towards those who have held resident hospital appointments. Applications for medical appointments should be sent to the Assistant Private Secretary, Colonial Office.

Information regarding medical appointments in Cape Colony and Natal can be obtained on application to the Agent-General to the Cape, 100 Victoria Street, London, S.W., and the Agent-General for Natal, 26 Victoria Street, London, S.W.

Medical appointments in Rhodesia are made by the British South Africa Company, 2 London Wall Buildings, E.C.; those in the Transvaal and Orange River Colonies are made on the recommendation of the Governors of these Colonies.

RECENT LITERATURE.

CRITICAL SUMMARIES AND ABSTRACTS.

MEDICINE.

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Sensory Disturbances in Visceral Disease.

Mackenzie's recent volume on *Symptoms and their Interpretation*, embodying the results of his previous researches on visceral reflexes that have appeared from time to time since 1892, must of necessity arouse fresh interest in a subject so important to the physician and to the surgeon. In this small book Mackenzie shows how symptoms that are vague and difficult of explanation can be rightly interpreted, and how certain signs, if properly searched for, may be present, and which will help in forming a diagnosis in many diseases of the thorax and abdomen. It is not my intention, however, to confine myself to a review of this interesting work, but rather to deal briefly with the subject of pain and other allied conditions dependent on visceral disease. The subject is a large one, but after all is said and done, most of our knowledge comes from the work of Mackenzie and Head. Almost simultaneously they noted that in visceral disease areas of skin were frequently found to be hyperæsthetic, the areas of hyperæsthesia conforming to definite segments of the spinal cord.

Ashley Mackintosh in 1897 and 1898, in the *Scottish Medical Journal*, has already reviewed the works of these writers up to that time, but since then important contributions have appeared, chiefly by Mackenzie, which still further support his theories on this subject. If I repeat, then, much that has already been reviewed, it is in order to make the summary more complete and of more use to anyone interested in the history of this subject.

Apart from Mackenzie and Head, several other writers must be mentioned as pioneers in this work, amongst them being Walshe, Hilton, Haller, Gaskell, Müller, Ross, Gowers, and more recently Gibson, Morison, Maylard, Lennander, Meltzer, Ramström, Langley and Sherrington.

Hilton published, in 1876, his fascinating book on *Rest and Pain*, and therein he showed that he was alive to the significance of pain in all its forms. "Every pain," he says, "has its distinct and pregnant signification, if we will carefully search for it." He noticed also that "external pain, or pain upon the surface of the body, if properly appre-

ciated, may be considered as an external sign of some distant derangement." He was aware of the close association between surface pain and visceral disease, for he tells us "that sympathetic pains on the surface of the body, connected with derangements of the internal viscera, are of great and pressing interest to us." He was aware of the importance of thoroughly appreciating referred pain in its many forms, and from his anatomical knowledge he was able to show how pain could be felt reflexly at considerable distances from the seat of irritation.

It was not, however, until 1886 that the structure, distribution and function of the nerves which innervate the viscera was understood. In that year Gaskell wrote his epoch-making paper on the "Visceral Nerves," and set a new field of workers afoot, more particularly Langley, Sherrington, and Morison. In 1888 Ross published a paper on the "Segmental Distribution of Sensory Nerves," and showed that in the primitive vertebrates, before the development of the limbs, each spinal nerve is distributed segmentally round one-half of the body. As development proceeds, the tissues which immediately cover the organ get displaced, so that the pain is referred to a distance. Hence the testicular pain in renal colic, and the pain down the arms in angina pectoris.

Ross divided the pain in visceral disease accordingly into two groups:—

1. Pain felt over the seat of the organ or *in* the organ, which he called "splanchnic pain."

2. Pain not situated over the organ nor *in* the organ, which he called "somatic or associated pain."

He noted that the somatic pain was felt over the cutaneous distribution of the sensory somatic nerves, whose spinal centres are closely connected with the sympathetic centres to the visceral organ affected, or, to put this in the words of Mackenzie, "the sympathetic nerves supplying the viscera issue from the cord with the cerebro-spinal nerves and supply the viscera at the same level, so that the nerve supply of the organ and the nerve supply to the covering external wall arise from the same region of the spinal cord." This observation had far-reaching importance, and almost simultaneously, in 1892 and 1893, Mackenzie and Head published their researches, which proved definitely that in visceral disease, on occasions, areas of hyperæsthesia appeared, which were of diagnostic importance. In 1892 Mackenzie noted, on inquiring into the symptoms of pains complained of by patients, that other symptoms were present, which he recorded.

He found "pains referred to other sites than the primary pain, and generally radiating by distinct nervous continuity, abnormal sensitiveness of certain structures to gentle pressure and disorders of sensation, generally hyperæsthesia, rarely anæsthesia." He noticed how the pain was frequently referred to definite areas, when particular organs

were affected. For example, in disease of the œsophagus, the pain was referred to the lower part of the sternum; in disease of the stomach, pain over upper part of epigastrium, also over 6th to 8th dorsal spines and along the 6th, 7th, 8th ribs and interspaces; in disease of the small intestine, pain around the umbilicus; in disease of the great intestine, pain midway between the umbilicus and the symphysis pubis; in disease of the rectum and uterus, pain over the upper half of the sacrum.

He was struck with the frequency of exquisitely tender areas of the subcutaneous tissues in visceral diseases, and also the frequency of tender spines.

He found that, as a rule, in heart disease, the 1st to 4th dorsal spines were most tender; in stomach disorder, the 4th to the 8th spines; and in liver disorder, the 8th to the 12th spines.

Even at this stage he was of opinion that the organs were in themselves painless, and that any pain over them was referred. Each organ was dealt with in turn, more especially, perhaps, the heart, as pain was so frequently an accompaniment of angina pectoris.

His theories were more fully described in his later papers, viz.:— "Some Points bearing on the Association of Sensory Disorders and Visceral Disease," which appeared in *Brain*, 1893; "Heart Pain and Sensory Disorders associated with Heart Failure," *Lancet*, 1895; "The Meaning and Mechanism of Visceral Pain," *British Medical Journal*, 1906.

Before entering into the results of Mackenzie's further observations in these papers, reference must be made here to the laborious and valuable papers written at this time by Head. In 1893 he published his first paper in *Brain* on the "Disturbances of Sensation, with Especial Reference to the Pain of Visceral Disease;" in 1894 part ii., "Head and Neck," appeared in *Brain;* in 1896 part iii., "Pain in the Diseases of the Heart and Lungs," appeared in *Brain*.

The results of these researches are briefly narrated in an article on "Pain," which appeared in *Quain's Dictionary of Medicine*, 1902.

"Head's zones" or tender areas are well known to clinicians now. They do not overlap, nor do they follow the distribution of the peripheral nerves. They are due to a heightened excitability of the nerve centres dependent on a constant stream of afferent impulses passing from the disturbed viscus to the cord, and from there to the external body wall.

These areas then correspond to the peripheral supply of segments of the cord. In this connection Head made many observations in herpes zoster, and found that in that disease the herpetic eruption was confined to a definite segment of the cord, just as in visceral disease.

Mackenzie does not agree with this, for he finds that the herpetic eruption does nor correspond exactly to Head's zones, but affects often neighbouring parts.

Leaving that difference of opinion on one side however, Head noticed that "true visceral pain is situated over spots that bear no direct relation to the position of the disease." These spots, in turn, cause the skin to become superficially tender, and on pinching the skin and subcutaneous tissue with the finger and thumb, or, perhaps better, by gently running over the sensitive area with a round-headed pin, he found that over the tender area the part felt "as if a bruise were being touched." These tender spots, he says, "represent the maxima of areas that extend round the body more or less in the form of a half girdle, and if the pain be very intense, the whole of one or more of these segmental areas may become tender." He was able to map out in this way the tender areas, and made drawings of them, in which also were marked the maximum points of pain.

He showed also how there may be a "generalisation" of visceral pain, depending on the spread in a definite direction of the pain and cutaneous tenderness, from the involvement of spinal nerves, whose roots are closely related to the part primarily affected. This generalisation may be due to long-continued pain, anæmia and neurasthenia, rise of temperature, menstruation, &c. He took particular note of head pains, and showed that each organ in the head stands in relation with one or more areas on the surface. To these areas pain is referred, and over them the skin may become tender, if the normal condition of the organ is disturbed—as from nose, eye, ear, tooth, tongue, glands, tonsils, &c.

Moreover, he noted that pain in the head was frequently secondary to disease of organs in the thorax and abdomen. "The lower the segment (down to the 10th dorsal) on the trunk that is affected, the more posterior will be the tender area on the scalp: the higher on the trunk, the more certainly will the pain and tenderness be found over the forehead." He found that below the 10th dorsal the segmented areas stood in no relation to those of the scalp.

In a later paper Head divided the sensibility of the skin into two classes—epicritic sensibility and protopathic sensibility.

By the first he meant the perception of the finer form of touch, accurate localisation, &c., and by the latter, the blunted form, where touch is not perceived, but where pain is felt in pricking with a pin, where localisation was less marked, and where only extremes of temperature were appreciated. This type—the protopathic form—was the one Head considered present in visceral sensibility.

Mackenzie does not agree with this, and in his papers he discusses very fully the meaning and mechanism and nature of visceral pain.

Mackenzie accepts the results of Langley's observations, that the efferent fibres of the autonomic system leave the central system at four regions:—

1. Those arising in the brain and supplying the sphincters of iris and ciliary muscle.

2. Those passing out with the 7th, glossopharyngeal and vagus nerves.

3. Those, including the sympathetic, which leave the spinal cord in the white rami from the 1st thoracic to the 2nd and 3rd lumbar nerves.

4. Those which leave the spinal cord in the 2nd and 3rd and 4th sacral nerves.

How the afferent fibres of the autonomic system run from the viscera to the cord has not been completely worked out, but Mackenzie believes that "under certain circumstances these afferent nerves of the autonomic system react upon the cerebro-spinal nerves, and stimulate them, so that certain phenomena, as pain, hyperalgesia, and similar contraction in the external body wall are the evidences of stimulation by the afferent autonomic nerves." Afferent impulses pass from diseased viscera to the cord and there stimulate neighbouring nerve cells, which react according to their function—"a sensory cell, by producing pain, a motor cell, by contraction of certain muscles, a secretory cell, by increased flow of the peculiar secretion, and so forth." Mackenzie pointed out, more especially in dealing with cardiac pain, how tenderness of certain muscles with their contraction may occur reflexly in visceral disease, as well as hyperæsthesia of the skin. Indeed, he insists on this as being a most important point in visceral pain, and one not often observed by clinicians. This viscero-motor reflex is a symptom quite distinct from the pain, although it usually accompanies it. In the external body wall the following tissues are highly sensitive :—

1. The skin . . . causing hyperæsthesia.

2. The muscles . . . causing hyperalgesia.

3. Layer of loose connective tissue lying immediately outside the peritoneum. Mackenzie's view of the sensitiveness of this layer has recently been upheld by Ramström, who has found that it is richly endowed with nerves and nerve endings. This will be discussed in greater detail afterwards in speaking of local as against referred pain.

With regard to hyperæsthesia of skin and hyperalgesia of muscles, Mackenzie finds that the zones are ill defined and not so limited as Head describes. These zones spread beyond the limit of the organ affected, and do not as a rule affect the whole of one segmental area.

Again, he has shown that, owing to the nerve supply of the abdominal muscles, there may be a contraction of only a limited portion of the muscle differing thereby from the limb muscles, where the whole muscle contracts. The importance of this observation, proved experi-

mentally also by Sherrington, is obvious, as in appendicitis, so frequently a strand of muscle may contract in the neighbourhood of the diseased organ, giving to the hand the idea that the appendix itself is felt, but which proved at the operation to be impossible, as it was well down in the pelvis or behind the cæcum.

Before entering into the question of whether pain is ever present in the organ itself, whether it is ever local as well as referred, it might be well to mention first the pain of various organs taken *seriatim*, commencing with the heart.

Heart Pain.—Gibson, in his book on *Nervous Affections of the Heart*, gives a very full description of the course of the medullated and non-medullated nerves to the heart, and describes, with the aid of diagrams, the intricate connection of the cardiac nerves and plexuses, and the anatomical relations between the sympathetic and spinal systems. It may be taken that the nerve supply of the heart is through the sympathetic and vagus and an intrinsic nervous mechanism. The sympathetic nerves to the heart are for the most part in the distribution of the 7th and 8th cervical to 4th and 5th dorsal.

Head has endeavoured to locate certain segments to special portions of the heart and aorta. He finds that in disease of the transverse arch of aorta, the inferior laryngeal segment is involved; in disease of the ascending portion of the arch the 3rd and 4th cervical and 1st and 2nd and 3rd dorsal; in disease of the ventricle, the 2nd, 3rd, 4th and 5th dorsal; in disease of the auricle, the 5th, 6th, 7th and 8th dorsal.

Let us refer for a moment to the sensory distribution of these nerves.

The 2nd to 4th cervical supply the skin on the back of head, neck and shoulders, and down the chest to the third rib. The 5th and 6th cervical supply the outer half of the upper arm, the radial half of the forearm, and part of the thumb. The 7th cervical supplies the hand and fingers. The 8th cervical supplies the ring and little fingers, ulnar borders of the hand, and, with the 1st dorsal, the ulnar border of the forearm. The 1st dorsal . . . see above. The 2nd and 3rd dorsal supply the inner half of the upper arm, axilla, and chest. The 4th and 5th dorsal supply the chest, the 5th dorsal descending as low as the upper part of the epigastrium (quoted by Mackenzie).

Hence it is understood how in angina pectoris, pain, truly cardiac, may be referred to certain definite areas, and cause hyperæsthesia of the skin. These areas do not always, however, conform to the distribution of definite nerves, or even to definite segments of the cord.

Although Head believes that this is always the case, depending on the part of the heart or aorta affected, Gibson hardly thinks so, for he says: "So far as concerns the matter of hyperæsthesia, it may, however, be stated in a word that although the exalted sensibility has always a fixed central area, its boundaries are often somewhat indefinite."

Mackenzie makes it a rule in the physical examination of all cardiac cases, especially in those where angina pectoris is present, to note any zones of hyperæsthesia in the chest, neck or arm, right or left; the skin is pinched, the breasts are lightly compressed, any tenderness of the pectoralis major is noted; tenderness of the sterno-mastoid muscle and upper edge of trapezius, and any especial area of tenderness over the 2nd and 3rd ribs in the nipple line.

Pain along the arm or over the chest is due to a reflex through the cervical and dorsal nerves, while pain in the trapezius and sterno-mastoid is a reflex through the vagus and spinal accessory, and, owing to the close association of the spinal accessory with the 2nd and 3rd cervical nerves, may in this way cause hyperæsthesia of the head and neck. He finds frequently tenderness of the first four thoracic spines: sometimes he has observed increased flow of saliva or urine in angina pectoris, from organic reflexes set up between the vagus and 5th cranial nerve—the reflex having its cell station in the nuclei on the floor of the 4th ventricle.

The term angina pectoris then, according to Mackenzie, "includes a number of reflexes—sensory reflexes, when the pain and hyperalgesia affect the chest, arm, head and neck; motor reflexes, resulting in spasm of the intercostal muscles; secretory reflexes, shown by profuse secretion of saliva and urine."

Mackenzie does not believe that the severity of the pain in angina pectoris is so important from the point of view of diagnosis, as its site and distribution.

Although Gibson speaks of "this sense of impending death dwarfing all other symptoms by its overwhelming character and stupendous importance," Mackenzie does not attach so much importance to this, nor does he hold that there is more than one pain in angina pectoris, due to a reflex, sensory or motor. In his own words he says: "I am convinced that these sensations (as if the chest were gripped in a vice, or as if the breast bone would break) arise from spasm of the intercostal muscles and correspond to the hard contraction of the flat abdominal muscles in affections of the abdominal viscera."

The pain is usually referred to the left side of the chest and arm, as the left chambers of the heart are most frequently at fault, but cases have been described by Morison, Gibson and Mackenzie where the pain was referred to the right side, owing to involvement chiefly of the right chambers of the heart. Cases are recorded also of pain referred to both sides. Over the painful area in angina pectoris, Gibson and Eichorst independently have noted wasting of the muscles and changes in the texture of the skin. Gibson says: "When muscular atrophy is found, the myotatic irritability may be increased, exactly as is the case in arthritic muscular atrophy, while the electric muscles show a distinct increase, both as regards faradism and galvanism. Changes in the eye

on the painful side may be seen—protrusion of the eyeball, elevation of the upper lid, and dilatation of the pupil result."

Mackenzie has made some interesting observations in connection with the areas of hyperæsthesia in cardiac disease. When the areas supplied by the 8th cervical and 1st and 2nd dorsal nerves are affected, he has noted frequently the presence of three reflexes :—

1. Pilomotor reflex—the presence of the goose skin over the part affected by hyperæsthesia. Mackenzie says : "If certain stimuli be applied to the skin, as by rubbing the skin with a piece of flannel over the part stimulated, the hair follicles may protrude (goose skin), due to contraction of the pilar muscles, which are attached to the hair follicles."

2. The autonomic sensation—a feeling of cold passing along the affected part, and not necessarily associated with the goose skin. This sensation is not due to the goose skin—as Mackenzie puts it. "The sensation is peculiar to itself, and to what it is entirely due I am not certain. The mere traction and shrinking of the skin does not appear to be its sole cause, because I find it present where there is no evident goose skin produced, and it even extends to areas where the hair follicles do not exist. Again, goose skin may be present when no such sensation exists." He is inclined to the view that it is a reflex through the cord, and likens it to the sensation of cold experienced on drinking a glass of cold water, which he believes to be due to the stimulation of vaso-constrictor nerve fibres in the spinal cord.

3. Autonomic pupil reflex—a dilatation of the pupil, owing to a stimulus affecting the cells in the cord, which supply the nerves of the dilator pupillæ. These fibres leave the cord with the upper dorsal nerves. I have frequently noted dilatation of the pupil in acute apical lobar pneumonia, where the upper dorsal nerves are affected.

Mackenzie has shown how frequently this reflex can be produced in cardiac affections. He rubs the skin under the nipple firmly. "If a goose skin appears spreading up the chest, or if the autonomic sensation is felt spreading into the arm, then a transient dilatation of the pupil occurs." If the autonomic sensation is felt, then almost certainly the pupil on the same side will dilate.

With regard to the pain in angina pectoris, Head and Mackenzie both believe that this may be due to increased tension in the chambers of the heart. Mackenzie noted that referred pains were usually in association with hollow muscular organs—the pain often being due to powerful contraction of muscle, although this was not necessarily referred to the part affected. Head described heart pain more fully from this standpoint of increased tension, and was of opinion that any cardiac state from valvular disease, which allowed of this tension being kept up, was a direct cause of pain. For example, in mitral

stenosis, where referred pain is seldom present, if the left auricle remained permanently full, owing to regurgitation backwards through the mitral orifice during its period of rest, then pain is referred to the neighbouring structures. Each cardiac lesion was dealt with in turn by Head, who showed on this assumption, that in pure aortic stenosis pain was not likely present, while in aortic regurgitation there was probably pain, and in double aortic disease almost certainly pain. In double aortic disease the pain quickly disappears, when the mitral valve secondarily becomes incompetent, as in this way the tension is lessened and the left ventricle partially relieved. Similarly in mitral disease—in mitral regurgitation there is no referred pain, in mitral stenosis (pure and simple) not usually referred pain, whereas in double mitral disease there is frequently referred pain.

Let us now shortly refer to pain associated with other organs before entering more fully into the discussion as to whether pain is sometimes local or is always referred.

(*To be continued.*)

SURGERY.

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Hæmostatic Compression of the Trunk.

Momburg's method of obtaining hæmostasis of the lower half of the body (*Centralbl. f. Chir.*, 1908, Nr. 23) has already been tried by several surgeons whose experiences have been reported in recent papers. Hæmostasis is procured by two or three turns round the waist of a rubber tube, the thickness of a finger, stretched to its full capacity. The constriction should be accomplished slowly and gradually, and the tourniquet is sufficiently tight when the pulsations in the femoral artery become imperceptible to the finger. The procedure was first tried in two healthy individuals for five minutes without anæsthesia, and they experienced no ill results. Then it was used in two prolonged operations, one of them lasting sixty-eight minutes. This was in a case of sarcoma of the cotyloid cavity operated on by Bier, and the lower limb and a considerable part of the bony pelvis were removed under perfect hæmostasis. In a later paper (*ibid.*, Nr. 41) Momburg reported another case in which he removed both lower limbs smashed in a railway accident. The tourniquet was applied for thirty minutes without

anæsthesia, and the patient suffered no more than is usual when an Esmarch bandage is fixed round a limb. Trendelenburg employed Momburg's method in an operation for sarcoma of the femur (*Soc. de Méd. de Leipzig*, December 1908), and Axhausen in a disarticulation at the hip (*Deut. med. Wochenschr.*, December 1908). The latter thought it superior to simple compression of the aorta. Willems (*Soc. de Chir. de Paris*, January 1909) records four successful applications, twice for disarticulation at the hip, once for an extensive resection of the hip-joint, and once for a partial resection of the bony pelvis. In the last case there was a difficulty owing to the existence of a pronounced scoliosis, and the pulsations of the femoral artery were not obliterated till a pad was fixed under the elastic tube. Verhoogen (*Journ. de Chir.*, Brussels, 1909, Nr. 1 and 2) describes the results as very good in three cases. Two of the patients suffered from prolonged suppuration after excision of the hip-joint. In one the right iliac boné, with the whole of the acetabulum, was resected, and in the second the inter-ilio abdominal disarticulation was performed "without the loss of a drop of blood." In the third case the rectum was excised for extensive prolapse. The abdominal bandage was applied to prevent the continual oozing from the hæmorrhoidal veins, which is such an annoyance to the surgeon. The whole operation was "like a demonstration on the cadaver." Leclerc (*Gaz. des Hôpit.*, 22nd June 1909) adds three cases, the most interesting being a perineal prostatectomy. The gland was greatly enlarged, and chronic retention with cystitis was present. Hæmostasis was perfect. A fourth case was not so successful. The operation was abdominal hysterectomy by Pfannenstiel's transverse incision for cancer of the cervix uteri. It was found impossible to keep the intestines away from the field of operation when the bandage was in position round the waist.

The application of the abdominal tourniquet has not led to any bad result in any of the reported cases. At the beginning the radial pulse may become small and frequent, but it quickly returns to normal. A similar change sometimes occurs when the bandage is removed, lasting not longer than one or two minutes (Leclerc). To prevent the oozing of the blood lying stagnant in the vessels, Momburg recommends the preliminary compression of the lower limbs by elastic bandages. They are removed after the waist tourniquet is applied, and then the limbs are lowered. No injury to the kidneys, ureters or intestine has yet been observed.

The surgeons who have made use of the method recommend it for the various conditions mentioned—operations at the hip-joint or on the bony pelvis, perineal prostatectomy, excision of the rectum. In addition, it occurs to us that the method would be valuable as a temporary means of checking reactionary hæmorrhage, for example, after curettage of a carcinomatous cervix, after a vaginal hysterectomy

if a ligature slips or a clamp snaps, or after an operation on the rectum or high up in the thigh. In secondary hæmorrhage also, say from the external iliac artery, it would allow of the transference of the patient to the operating-table, where the necessary measures for stopping the hæmorrhage could be more satisfactorily carried out.

Exploration and Decompression for Cerebral Tumours.

From a surgical point of view, tumours situated in one cerebral hemisphere have customarily been classed as suitable or unsuitable for removal. There is, however, a third group comprising the doubtful cases, in which the possibility of removing the growth cannot be decided until it has been exposed. In them one of two methods has hitherto been employed, either a mere palliative subtemporal decompression, or the raising of an osteoplastic flap in the hope of removing the tumour. In the latter event if the removal was now found to be impossible, and decompression was indicated, the only resort at this stage was to remove the whole bone-flap. The consequences of this treatment may be serious. The size of the cerebral protrusion, increased by œdema, may interfere with the union of the scalp wound and cause a hernia cerebri. Or, the pyramidal fibres from the Rolandic area, which is exposed in the majority of cases, may be injured by œdema in the existence of great tension, and a one-sided paralysis result. It is to obviate such a complication that a "silent" area is selected for a simple decompression. Again, the removal of bone over the seat of the tumour is not infrequently followed by an increase in the size of the growth from hæmorrhages into its substance. Cushing (*Journ. of Surg., Gynec. and Obstet.*, July 1909) overcomes the difficulty in these doubtful cases by a simple expedient. He gives the chance of a radical operation by reflecting a large osteoplastic flap with bevelled edges. If the tumour is unsuitable for removal or no tumour is visible, while decompression is called for, a subtemporal area of bone is removed by heavy rongeur forceps. The upper half of the circle is removed from the lowest part of the bone-flap, and the other half from the side of the skull below the flap, the temporal muscle being held out of the way. The dura is then opened in stellate fashion over a sufficent area for decompression. A wider inspection of the cortex cerebri may be carried out by temporarily reflecting the dura from below upwards over the rest of the exposed area. In cerebral tumour it is usually found that very little cerebro-spinal fluid escapes through the dural opening. That the hemisphere may settle back in such cases and allow of thorough exploration, lumbar puncture is recommended in spite of its possible danger (shutting off the circulation in a hernia through the foramen magnum). The cortex can then be pressed away by means of a spoon-shaped, round-edged spatula,

and its condition determined by inspection from pole to pole. If subcortical exploration is not indicated, the temporary dural flap is then closed by sutures and the osteoplastic flap replaced. The result is a bony defect under the temporal muscle as in a simple decompression operation. Cushing has adopted this procedure in twenty operations within the last two years "with fairly uniform satisfaction." In some patients in whom no tumour was exposed under the flap, one was discovered during the wide inspection of the cortex, or in the subtemporal region below the tourniquet. The method may also prove of advantage after extirpation of the tumour, where post-operative œdema or a recurrence of the growth is feared, or the removal has been incomplete.

The Sequels of Perineal Prostatectomy.

Moore (*Journ. of Surg., Gynec. and Obstet.*, July 1909) discusses the prevention and treatment of the sequels of perineal prostatectomy. The latest statistics show a mortality of a little over 6 per cent., and over 17 per cent. of the operations are either complete failures or are followed by some mishap. Continuance of pain and tenderness ought rarely to be the cause of failure if the operation and after-treatment are properly conducted. It is almost invariably due to a pocketed bladder or an incomplete operation. Another sign of failure, the necessity to continue the use of the catheter, is not always avoidable in the patients who have used it for years, for in such the atony of the bladder may be complete. Its occasional occurrence is a strong argument against a prolonged catheter life. Of the sequels, the not infrequent loss of sexual power is of importance in the comparatively young and able-bodied. When the arguments for and against operation are being discussed with patients of this class, the possibility of its occurrence must be set against the dangers of a catheter life. Injury to the rectum is probably the most frequent serious complication in perineal prostatectomy. It often results in death, and when the patient survives he is liable to have a urethro-rectal fistula, a condition occurring in 2·7 per cent. of the reported cases. The injury is most commonly caused by the use of tractors pulling downwards, or by packing inserted too tightly or allowed to remain too long. Moore recommends the inspection of the rectum in every case after removal of the prostate, and the immediate suture of any laceration. Stricture of the urethra is not uncommon, and is usually due to the reckless sacrifice of the prostatic urethra. It is best prevented by preserving the mucous membrane of the upper urethral wall intact. Stricture may also be caused by the cicatrisation after extensive cross-cutting of the perineum. Occasionally, retention of urine occurs even when no stricture exists and the bladder wall has not lost its tone. It may

be due to a piece of the torn urethra projecting into the channel and acting like a valve. These flaps are situated at the vesical outlet and at the apex of the prostate. To prevent their formation Cabot recommends that the third lobe be drawn out through the urethra and cut off smoothly. Incontinence of urine occurs in 3·5 per cent. of cases, and is due to injury of the bladder or the compressor urethræ. The enucleating finger, or instruments introduced into the bladder to drag the prostate down during operation are apt to cause vesical lacerations unless great care is exercised. The compressor urethræ is best preserved by invading the membranous urethra as little as possible. The incision in the urethra for the introduction of the finger should begin well toward the apex of the prostate. Fortunately the incontinence is often cured by nature. Perineal fistula is a rare sequel, and is perhaps best treated by temporary supra-pubic drainage. Irritation and slow healing of the wound may occur, and are often caused by calcareous deposits. Epididymitis is probably due to the passage of bougies to prevent stricture, a routine practice which is not to be encouraged. The inflammation may be so severe, especially in the old and feeble, as to cause sloughing of the whole epididymis.

OBSTETRICS AND GYNECOLOGY.

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Treatment of Inoperable Cancer of the Cervix.

Any new method which holds out a hope of diminishing the pain, the hæmorrhage and the terribly fœtid odour in advanced and inoperable cases of cancer of the uterus is welcome. Gellhorn (*Amer. Journ. of Obstet.*, May 1909) gives further details of a method, a report on which he first published two years ago, in which acetone is the agent employed. He points out that the fœtid discharge in these cases is due to the invasion of the necrotic tissue by saprophytic organisms. Any method, such as cauterisation, either by means of the actual cautery or by chemical agents, ultimately increases the amount of necrosis, and, as the organisms soon gain access again, the temporary relief is followed in a short time by aggravated discharge. Acetone is not a caustic. It is a clear, mobile, volatile liquid with an ethereal odour, and has the property of penetrating tissues very rapidly, owing to its intense hygroscopic qualities. Its action in the cancerous

tissue is probably analogous to that seen when the substance is used for the hardening of tissues for histological purposes.

The technique employed by Gellhorn is as follows:—The patient is put in the lithotomy and exaggerated Trendelenburg position. The cancerous cervix is thoroughly scraped so that the greater part of the disease is removed and a large crater left at the roof of the vagina. This is dried out, a tubular speculum is introduced, and from half an ounce to one ounce of acetone is poured through it into the wound and allowed to remain in contact with it for from fifteen to thirty minutes. The acetone is then run off, the cavity packed with a thin piece of gauze soaked with it, and the lower part of the vagina protected by a plug of cotton-wool. This initial treatment requires the administration of an anæsthetic, but the subsequent treatment can be carried out without it. Twice or three times a week, beginning four or five days after the first application, the acetone treatment is repeated. The acetone is poured down a tubular speculum into the excavated roof of the vagina, the patient's pelvis being tilted, allowed to remain in contact for about fifteen minutes, and then run off. The vagina is swabbed dry, and a tampon of cotton-wool covered with vaseline introduced. Care must be taken to prevent the acetone coming in contact with the lower part of the vagina and vulva, and this can be prevented by smearing the external genitals and lower third of the vagina thickly with vaseline. If any should get on to the labia the slight smarting is soon relieved by douching with cold water. No burn is produced. According to the author, this treatment results in an arrest of the hæmorrhages, the fœtor very quickly disappears from the discharge, and the latter ultimately almost entirely disappears. As a result, the general condition of the patient very materially improves, and life may be prolonged for one or two years. He is careful to point out that this treatment is not a panacea. It does not give the same good results in fungating cancer of the vagina, owing to the difficulty of its application. In these cases a sulphide of acetone may be used. It is a white powder which can be applied on cotton-wool pledgets. On coming in contact with the secretions of the ulcerated tissue acetone is liberated, which acts in the same way as when applied in the liquid form. While diminishing hæmorrhage and fœtid discharge, acetone seems to have little effect on the pain always associated with the advanced stages of uterine cancer. This must be relieved in the ordinary way by the administration of opium or other drugs.

The Treatment of Placenta Prævia.

Krönig (*Zent. f. Gynäk.*, No. 15, 1909) has been led, by the numerous papers appearing on this subject, to make an analysis of his own cases and to discuss the results obtained. He seeks to con-

trovert the view held by some writers that placenta prævia is a condition which should never have a fatal issue if the treatment is properly carried out. He holds that certain cases terminate fatally in spite of any line of treatment which may be adopted, and that, therefore, newer and better methods must be devised. He places the greatest reliance on early bipolar version and the bringing down of a leg. The hydrostatic bag he has also used, but the results have not been so good as those obtained by version. Hæmorrhage can always be arrested by the latter method, and only seldom is it necessary even to exert traction on the foot. The fatal results which he has had have never been due to hæmorrhage occurring before the birth of the child, but to hæmorrhage occurring after its expulsion and before the birth of the placenta, or to post-partum hæmorrhage. Post-partum hæmorrhage may begin immediately after the placenta is expelled or not till an hour later. Its control is much more difficult in placenta prævia than when the placenta is situated normally. In the latter case packing of the uterus and vagina is practically always effective; in the former the pack, however tightly inserted, is often soaked through and has to be replaced. Sepsis is a common complication in the puerperium. He strongly advocates the hospital treatment of all cases, pointing out how much better the hospital statistics are than those of extern cases. In practically all his cases—and this is the general rule—there were one or more preliminary hæmorrhages before the onset of labour, and the occurrence of these ought to be regarded as a danger signal and an indication for the transference of the patient to hospital or nursing home.

The question as to the place of Cæsarean section in the treatment of placenta prævia was discussed at the annual meeting of the American Gynecological Society (*Amer. Journ. Obstet.*, June 1909), and opinions were expressed for and against. Harrison, in opening the discussion, said that, while in the great majority of cases the ordinary obstetric procedures of turning or dilatation were sufficient, there was a class of case in which Cæsarean section held out the best hope of recovery for the mother and of the birth of a living child, viz. in cases of central implantation of the placenta where the hæmorrhage was severe, and the cervix rigid and not taken up—a condition of affairs often met with in elderly primiparæ. In such cases the ordinary classical Cæsarean section might be done, or, as Harrison prefers, vaginal Cæsarean section by Dührssen's method. Jewett was opposed to the use of either abdominal or vaginal section in placenta prævia, and brought forward statistics to show that while the fœtal mortality was slightly lessened, the maternal was decidedly increased as a result of these procedures. Most of the speakers agreed with him in condemning the treatment, but Fry held strongly that in the type of case above referred to abdominal section was the correct procedure to adopt, provided the

facilities for its performance were at hand. He pointed out that a great many of the bad results were in cases where the Cæsarean operation had only been done as a last resort after much obstetric manipulation had been carried out, with the result that sepsis supervened. In such cases he preferred the Porro operation, reserving the ordinary operation for cases seen early, and which had not been interfered with. Grandin held that abdominal Cæsarean section was practically never called for in placenta prævia, and that only in a limited number of cases was vaginal section required. This was practically the outcome of the discussion, the only strong advocates of the operation being, as one speaker pointed out, those who had a strong leaning to abdominal surgery, and whose obstetric practice and manipulative skill had, as a consequence, rather fallen into abeyance.

Vaginal Cæsarean Section.

It is a pity that the above should have come to be the usual designation of the operation introduced by Dührssen, now some years ago, as it is apt to mislead as to the nature and scope of the operation. Some such name as "vaginal hysterotomy," which is often used in American literature, would be preferable, for "vaginal Cæsarean section" is practically nothing more than free incision of the cervix and lower uterine segment from below in order quickly to deliver the uterine contents. Reuben Peterson (*The Physician and Surgeon*, No. 2, 1909) gives a full and detailed account of the indications for and technique of the operation, drawing from his own experience and from the literature on the subject. Before beginning the actual operation, it is most important in the case of primiparous patients to dilate the vagina fully with the hand, and, if that is not sufficient, make a free oblique incision through the perineum, severing the levator ani muscle on one side. If this is not done bad lacerations of the vagina will follow attempts at delivery of the child. The cervix is seized with a volsellum and drawn to the vaginal orifice, a longitudinal incision is made in the middle line of the anterior vaginal wall from cervix to within 2 cm. of the meatus urinarius, and a transverse one at the cervico-vaginal junction. The vaginal wall is dissected off the bladder, and the latter is pushed up off the front of the cervix, and is held up behind the pubes by means of a retractor. With a pair of scissors the cervix is then incised in the middle line anteriorly, and the incision continued upwards into the lower uterine segment, the bladder being pushed still farther up, and also, if necessary, the peritoneum. The latter is never incised. When this has been done, the lower pole of the uterus has been opened up, and the child can be immediately extracted either by turning or by forceps. In some cases if sufficient room is not got by the anterior incision, the cervix may be divided posteriorly in the same way. After

delivery of child and placenta the cervix is stitched with interrupted catgut sutures, the bladder is brought down, and the vaginal incisions closed. The operation is easily done in the pregnant woman owing to the laxity of the tissues, and ought to be capable of performance by the general practitioner, as very little assistance is required.

Peterson gives three main indications for the operation :—(1) Rigidity of cervix from any cause such as cicatrices or cancer, which prevents dilatation ; (2) when the uterus has to be emptied quickly for maternal complications, and cervix is not dilated; (3) when the life of the fœtus is threatened, and the cervix is not dilated. In cancer of the cervix incision is much safer for the mother than dilatation. Dührssen has collected 45 cases where this was the indication for the operation. After delivery the uterus ought to be removed by vaginal hysterectomy, the preliminary stages of which have already been performed. Several cases have been recorded where the operation has been successful in dystocia following operations for displacements of the uterus, and Peterson himself records one such. It is in eclampsia, however, that the great indication for the operation is found, at least for those who believe in the immediate delivery of the eclamptic patient. In placenta prævia the indication is more doubtful, and while some operators recommend it, the majority do not, on account of the difficulty of its performance while a free uterine hæmorrhage is going on, and because of the danger of increasing that hæmorrhage by incising through the placental site.

NEW BOOKS AND NEW EDITIONS.

A System of Operative Surgery. Vols. I. and IV. Edited by F. F. Burghard, Teacher of Operative Surgery in King's College, London. London: Henry Frowde, Hodder & Stoughton. 1909.

This new system of operative surgery, when completed, will consist of four volumes. The two volumes now published indicate that it will be a standard and comprehensive work on the subject. The editor has the assistance of a number of surgeons who have made themselves known in the branches of the subject for which they are responsible, so that their views may be taken as representing the methods and technique adopted by the British School of Surgeons. The first volume deals with introductory subjects. It comprises the Principles and Technique of Wound Treatment, by Mr. Lockwood ; Local Analgesia, by Captain Houghton, R.A.M.C. ; Amputations, Operations on Arteries,

Veins and Lymphatics, Nerves, Muscles, Tendons and Bursæ, and Operations for Non-Tuberculous Diseases of Bone, by Mr. Burghard; and Plastic Surgery, by Mr. T. P. Ligg.

Mr. Lockwood discusses the methods of disinfecting the instruments and materials used in operations. The term asepsis is used in the broad sense, its meaning not excluding the use of mild antiseptics. He points out that those who claim to be strictly aseptic in technique habitually use strong antiseptics for their sutures and for cleansing the hands and the patient's skin. For cleansing the hands or sponges during the operation he uses a 1 to 1000 or 1 to 4000 mercuric iodide solution, and claims that the weaker solution has no harmful effect on the tissues. If satisfied as to the conditions, he is quite content to use normal saline, but if there is any suspicion as to infection from the environment, he prefers to use mild antiseptic lotions, and this applies to work in London, where the risk of aërial infection is greater than elsewhere.

The chapters on Infiltration and Regional Anæsthesia are based on the work of Barker and on the author's own experience. The solution generally recommended is one-fifth per cent. eucain and adrenalin. As much as 6 grains have been injected in an extensive area without ill effects. For lumbar anæsthesia, Barker's 5 per cent. solution is used. No mention is made of the new method of local anæsthesia by intravenous injection of novocain, recently introduced by Bier. This method, of course, has not yet had sufficient trial for its value to be estimated.

Amputations and disarticulations are described in great detail, and are well illustrated. One would like to have seen in amputations, about the middle lower thirds of the leg, some mention of the osteoplastic methods which have been employed to allow the weight to be borne on the end of the stump.

Recent work in the surgery of the vessels and lymphatics is fully touched upon. From the published results of Matas's operation, endoaneurysmorrhaphy would appear to be most useful in aneurysms, when it is difficult to extirpate the sac wall, as in those met with in the groin, popliteal space, axilla, and at the bend of the elbow.

The results from reversal of the systematic circulation in senile gangrene have not been encouraging, although one completely successful case operated on by Wieting is quoted.

In operations on veins no mention is made of the subcutaneous "stripping" methods of Mayo and Babcock. The section on the Nerves, including the Gasserian ganglion, is an excellent one, a really difficult subject being made to appear easy by clear descriptions and excellent illustrations.

The operations on the bones and joints have unfortunately been divided into two sections, one appearing in this volume from the pen

of Mr. Burghard on the non-tuberculous affections, and the other by Mr. Stiles on the operations for tuberculous diseases, to appear later. This is not only inconvenient for the reader, but will necessitate a good deal of overlapping.

In volume iv. the high standard of the first is more than maintained. Mr. Bland Sutton writes in his accustomed admirable manner on the abdominal operations required for the diseases peculiar to women; the vaginal ones are by Dr. John Phillips, of King's College Hospital. Mr. Mayou has undertaken the operations on the eye; Mr. Hunter Tod is responsible for those on the ear; Mr. Douglas Harmer for those on the larynx and trachea; and, lastly, Dr. St. Clair Thomson for those on the nose and its accessory cavities. The descriptions throughout are clear and exhaustive without being exhausting, and the steps of the different procedures are so admirably and abundantly illustrated that the reader's task is considerably lightened.

The publishers are entitled to the highest commendation for their share in the production of the work. We confidently anticipate that this system of operative surgery will more than hold its own when compared with those published in other countries.

Manual of Operative Surgery. By JOHN FAIRBAIRN BINNIE, Professor of Surgery, Kansas City. Fourth Edition. Vol. I. London: H. K. Lewis. 1909. 14s. nett.

A CLOSER knowledge of Professor Binnie's *Manual of Operative Surgery* makes us appreciate it more with each successive edition. We note with great pleasure that the author is now engaged in the completion of the work so as to deal in volume ii. with operations on the extremities, which readers of Mr. Binnie's book had previously to obtain from other sources. The author has the happy knack of selecting those operative measures which are most useful in practice, of describing them in pithy language, and in providing illustrations which, without being elaborate, fulfil their purpose admirably. The author has travelled a great deal, and has had the advantage of seeing many of the men whose methods he quotes engaged in their own lines of work, and it is this which imparts to the work its eminently useful qualities. We certainly prefer it by a long way to any other book on Operative Surgery in the English language.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES AND NEWS.

Medical Inspection of School Children.

THE *Scotsman* of 27th October contains an article by a "Legal Contributor" on the Medical Examination of Children. The writer discusses "the powers and obligations of school authorities," particularly in reference to the Edinburgh Merchant Company Schools. The article contains a fair enough statement of the legal powers conferred on School Boards by the Education (Scotland) Act, 1908, but there is an undertone of somewhat unmotived opposition to the Scotch Education Department. By its recent circular and memorandum on the Medical Examination and Supervision of School Children, the Department did no more than indicate to school authorities what their duties under the Act were, and how they might efficiently discharge them. The response all over Scotland has been so cordial as to excite the wonder and admiration of many old administrators. This shows that the medical examination of school children is no fad of the Department, but the natural expression of a long repressed social impulse to increase the fitness of children for their work. But "Legal Contributor," somewhat after the fair, indicates difficulties, most of which seem to arise out of the failure of the better off parents to realise the advantage of the systematic examination of their children. The School Board have found no difficulties. Before the Act came into force, they had already appointed a School Medical Officer, who is now to have two medical assistants, and a staff of three or more nurses. Meanwhile, the Merchant Company, like the Heriot Trust and the Provincial Committee, had arranged for the medical examination of their own children. But apparently the Merchant Company preferred, no doubt under medical direction, to have the schedules filled up by the pupil's "family doctor." It should be explained that, if the Merchant Company had not made any arrangement, they would normally have had the pupils examined by the School Board's Medical Officer and his staff. The company, however, elected to organise their own examination, and the article by "Legal Contributor" is one of the results. Let us look at a few of his points.

First, the schedule. "Legal Contributor" summarises the schedule quite clearly, but seems to suggest that it is too elaborate. Naturally, to the lay mind and even to the inexperienced medical mind, the Department's schedule appears very elaborate; but a little experience would dispel the illusion. The schedule is the result of the most careful discussion by Medical Officers of Health, members of the British Medical Association, members and officers of the London County Council, the English Board of Education, and several

committees or commissions. Experience in England, where the same schedule is in force, has shown that it is simple, practical and efficient. Many English education authorities and one or two Scottish authorities, including the Edinburgh School Board, have even expanded the number of items. "The surprising statement," says "Legal Contributor," "is made that the examination of each child need not, on the average, occupy more than a few minutes. It seems impossible to reconcile this with the terms of the schedule." Here speaks inexperience; but the "Legal Contributor" indicates a possible answer further down when he says, "There are the bright, healthy children, who perhaps for five or six years have never had an illness or a day's absence from school and have always kept a good place in their classes." Precisely; these are the children that take only a "few minutes;" but it is well that they should have the advantage of the few minutes. Fortunately, they form the considerable minority in the schools, and thus economise time. Another item troubles "Legal Contributor," namely, "the personal and home life of the child can also be brought under systematic supervision." But the memorandum "does not explain how this is to be carried out." The memorandum does explain clearly enough. The school authority is to work in co-operation with the Public Health authority, which is invested with the fullest powers to deal with the whole sanitation of the home.

Second, statistics. In discussing the various obligations of parents and school managers, and the possible exclusion of children that the parents refuse to have examined, "Legal Contributor" says: "This would be a high price to pay for the gratification of that craze for statistics which has suddenly afflicted Dover House." One would suppose that the Department had insisted on nothing but statistics. But here is what the Department says in the memorandum:—"The Department desire to emphasise their view that the purpose of the new legislative provisions is not merely to accumulate statistics of physiological conditions, or to provide materials for scientific discussion, but to secure in every possible way the improvement of the coming generations. . . . The immediate object of the medical examination and supervision here enjoined is therefore entirely practical. The School Boards should satisfy themselves that every pupil under their charge is fit to profit by the education offered. This they can do only by medical examination. They should also secure that, as far as practicable, the health of the pupil is maintained at a proper standard. This they can do only by constant medical supervision. If the broad purposes of the new Act are to be realised, the medical examination must be an individual examination of every child, with the object of discovering what can be done to promote his highest personal efficiency, both as a present pupil and as a potential citizen." The high ideal thus set before the Education Authorities of Scotland seems not to have appealed to many of the parents who send their children to Merchant Company Schools. "Legal Contributor" seems

anxious to show that parents cannot be compelled to accept the enormous advantage of medical examination at school, and that they need not spend money on the family doctor. One would suppose that middle-class parents, who already pay high fees for the education of their children, would accept with the greatest readiness the free services of expert School Medical Officers. Why compulsion of parents should at any point become necessary, neither "Legal Contributor" nor anyone else has as yet made clear. The advantage of examination by the School Medical Officer is wholly on the side of the parent.

Third, can the Merchant Company exclude a child if the parents refuse to have it examined? It is to be hoped that the Merchant Company will never have to raise the question. Surely the majority of their clients have enough common sense to see for themselves that they have everything to lose and nothing to gain by refusing to have the child examined. But, in any case, the power of compulsion rests, we believe, not with the Merchant Company nor with any other private authority, but with the School Board, whose duty it is to see that every child attends *some* school. If this be so, the Merchant Company would not be placed in the invidious position suggested by "Legal Contributor;" for, as they are entitled to lay down the conditions of attendance at their own schools, they can exclude any child that fails to fulfil any of the conditions; but it is the School Board that enforces attendance at *some school* or sees that the child is otherwise educated. No doubt, in an old community like ours, there will always be a remnant that prefer to "cut off their nose" for the usual reason; but, fortunately, they are only a remnant. The common-sense people, who are the majority, will quietly and straightforwardly take the trouble to see that their children have every advantage that preventive medical care can give them.

One further word. There seems to have been some curious ineptitude in sending directly to parents a medical schedule with detailed instructions for its filling in. There probably would have been less heart-burning had a little more experience of the world been brought to bear. A polite intimation to the parent that his family doctor would receive a schedule would have saved all these tears. "Legal Contributor's" article reminds us of the old man's remark to his young friend: "I have had a great many troubles in my life, *and half of them never happened.*"

The Late Nurse Dickson. JUST as we go to press we have heard of the death of Sister Dickson. Every Edinburgh graduate for the last forty-seven years knew Nurse Dickson. In later days she was called Sister Dickson, but her old title suited her well. Sister Dickson was one of those women who were nurses by divine right. She had a fair nurse's training, but when she was selected, as a young woman of twenty-three (later she said she was younger), to be head nurse in Dr. Joseph Bell's wards, she at once took her position

A pleasant-looking plump woman, she began her work quietly and gently, with absolute self-possession. She spoke very little; she had the power of expressing her thoughts by her mode of breathing. Her hands were both strong and soft, and she knew all about bandages and splints without being told. Her readiness was remarkable; when her chief had to run to the waiting-room to see a choked child, she was there with a knife in her hand, and a trachea tube in the pocket of her apron. The Lady Superintendent trusted her, and more than once a probationer, who had not been a success, was sent to her as a last resource—generally with success. She was the one to teach probationers how to bandage. Her patients adored her, the students obeyed her, and her chief put the most absolute trust in her wisdom. She was very home-loving, rarely went out of hospital, and took her day off in the wisest manner—on her bed, with her hair over the pillow to give it air. Those of us who knew her well knew some trials in her lot, but she never complained, and did not often indulge in the luxury of a good cry. For fourteen years she gave unsparing help to her first chief, and for fifteen more she served another (Dr. P. H. Maclaren), before taking the easier post of the students' ward. After some years there she had to retire, with a well-earned pension from the hospital. She then set up a home for nurses, which was most successful. Her health began to give way; her summer holiday did not help her, and she died on 27th October full of years and honour. A life to be imitated, and a death to be desired.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.

At a meeting of the College, held on 19th October, the following gentlemen were elected Fellows:—Alexander Allan, L.R.C.S.E., Glenalmond; Robert Brodie Anderson, M.D., L.R.C.S.E., Winnipeg; Walter Ernest Barrett, L.R.C.S.E., Colwyn Bay; Oliver Carlyle, L.R.C.S.E., Edinburgh; Alexander Ernest Chisholm, M.B., Ch.B., Edinburgh; Ramsay Lamy Daly, M.D., Johannesburg; Ezra Newton Drier, M.D., Vancouver; Charles Gordon Edmonston, M.B., Ch.B., Portobello; Mark Stewart Fraser, M.B., Ch.B., D.P.H., Edinburgh; John Daniel Harmer, M.B., Ch.B., Exeter; Robert Hillhouse Jamieson, M.B., Ch.B., Edinburgh; James Kirkwood, M.B., Ch.B., Captain, I.M.S.; John M'Culloch, M.D., Ontario; Alexander Church Brodie M'Murtrie, M.B., Ch.B., D.P.H., Edinburgh; Herbert Michael Moran, M.B., C.M., Sydney; John Murdoch, M.B., Ch.B., Shettleston; Frank Porter Patterson, M.D., Quebec; Francis Edward Price, M.R.C.S.Eng., Ipswich; Vivian Heathcote Roberts, L.R.C.S.E., Captain, I.M.S.; William Tarr, M.B., Ch.B., Captain, I.M.S.; Robert Telford, M.D., Vancouver; James Alexander Thwaits, M.B., C.M., Johannesburg; and Frederick Herbert Wallace, M.R.C.S.Eng., London, N.E.

At the same meeting the Victoria Jubilee Liston Prize of £100 for the greatest benefit done to Practical Surgery by a Fellow or Licentiate of this College, during the quadrennial period from 1905, instituted by His Excellency the late Dr. Robert Halliday Gunning, was awarded to Mr. Robert Jones, F.R.C.S.E., 11 Nelson Street, Liverpool.

A GLANCE AT ANATOMY FROM 1705 TO 1909.[1]

An Introductory Address.

By ARTHUR ROBINSON, M.D.,
Professor of Anatomy in the University.

Gentlemen,—The custom of our University, in accordance with which each newly-appointed Professor is expected to deliver an introductory lecture, is not likely to be objected to by the individual himself, for it possesses the obvious advantage of allowing him to present to his first audience something other than a purely scientific or technical exposition of his own special subject. The custom allows him unlimited choice, but he is perhaps well advised if he selects a topic, the consideration of which may possibly provide useful suggestions for the future work of his own department.

You will admit, I think, that I stand to-day in a grave and anxious position. I am placed, as it were, at the end of a road, hewn out of circumstances by my illustrious predecessors, and emblazoned by the records of their achievements, and I have to attempt, with your assistance, to carry that road onward into an unknown future, in which both you and I will be held responsible for the work we have done.

An onerous task is before us—one which cannot be accomplished by haphazard work, one which requires concentration of energy toward a definite object.

We have to decide what that object shall be. Before making the choice we cannot do better than examine the records of the past, for although Bolingbroke's assertion that "history is philosophy, teaching by examples" may be open to dispute, nevertheless the results of past actions considered in association with the time and circumstances of the occurrence of the actions frequently point the way through the present into the future. Nor is it surprising that they should, for, if the reason for the actions was sound, it was based upon principles accepted by human nature, and human nature, like the human form, changes but little from age to age, though the nature may express itself in different words and phrases, as the form dresses itself in different clothes, whilst the years pass away.

We have, therefore, to seek for the principles accepted by our predecessors; to note the plans they adopted under the guidance

[1] Delivered in the M'Ewan Hall, Edinburgh, October 1, 1909.

of the principles they accepted, we have to question the soundness of the principles and the utility of the actions. We have to decide if we will accept the same principles and if we will attempt to carry on the road on the lines laid down in the past, or if we will strike out into a new path with the hope of thereby more quickly and surely attaining the object of our aim.

I do not wish to weary you with a detailed account either of the history of Anatomy or the history of the Chair of Anatomy in Edinburgh, but I do desire to draw your attention to some of the broader features of that history, and to ask you to note certain periods and some of the events which occurred therein.

The history of the Chair of Anatomy in the University of Edinburgh commenced in 1705, when Robert Eliot was appointed Professor of Anatomy by the Town Council. Eliot lectured in the Surgeons' Lecture Theatre, which had been completed in 1697.

After he had held the office for a few years, Adam Drummond was associated with him as co-Professor, and when Eliot died John M'Gill was associated with Drummond in a similar capacity.

In 1720 both Drummond and M'Gill resigned to make place for Alexander Monro, primus, and from that time the fame of the school advanced rapidly.

For the first few years after his appointment Monro, primus, also lectured in the Surgeons' Theatre, but in consequence of trouble which arose in association with the supply of subjects he moved for safety into the University.

Anatomy had already attained a high stage of development when Monro, primus, became Professor. The earliest anatomists, Empedocles, Anaxagoras, Hippocrates, and Galen, carried out their observations mainly, if not entirely, upon animals. After Galen's death in the latter part of the third or the early part of the fourth century, anatomical research tarried, and it was not revived or extended till the Middle Ages were passed. In the period before the revival the anatomical descriptions upon which medical men depended were those furnished by Galen's accounts of monkeys or lower forms, or descriptions of the pig, which was considered to be an animal not dissimilar to man.

In the fifteenth and sixteenth centuries Berenger of Carpi, Mundius, Leonardo da Vinci, Vesalius, Eustachius, Fallopius, Arantius, Varolius, and many other pioneers of anatomy whose names are still associated with various parts of the human body gave great impetus to the study and teaching of Anatomy.

Vesalius is called the father of human anatomy, not because

he was the first to dissect human bodies, for in that he had been preceded, but because, by his numerous dissections and description, he was the first to place human anatomy on a satisfactory basis.

During the seventeenth and the early part of the eighteenth century the progress of anatomy was still further accelerated.

Willis greatly simplified and extended the knowledge of the nervous system, and particularly that of the brain.

Caspar Bartolin, secundus, Wharton, and Needham extended the knowledge of glands and their ducts.

Swammerdam and Ruysch improved the methods of injection Sylvius had previously used, and by their means demonstrated small vessels unknown before.

Harvey discovered and proved the circulation of the blood.

A considerable amount of knowledge regarding the lymphatic system had already been gained.

The invention of the microscope, though the instrument then existed in only a very rudimentary form, had enabled Malpighi and Leeuwenhoek to investigate and describe some of the more obvious characteristics of the tissues, and by the use of an improved instrument Leeuwenhoek had discovered the blood corpuscles in the blood and spermatozoa in seminal fluids.

In the meantime, Regnier de Graaf had described follicles in the ovary, which are still known by his name, "Graafian follicles," but he had failed to differentiate the ova from the other contents of the follicles.

In the time of Monro, primus, anatomists were divided into two great groups—"ovoists" and "animalculists"—both of whom believed that all parts of the adult body existed in miniature in the germ. Both groups, therefore, were "preformationists." They differed from each other in that the ovoists believed that all the preformed parts were in the ovum, where they lay quiescent awaiting the advent of a spermatozoon to stimulate them into activity, and the animalculists believed the preformed parts to be in the spermatozoon, the ovum being merely a pabulum necessary for growth and development.

Monro, primus, was well acquainted with the knowledge of Anatomy and allied subjects as it existed in his day.

He was an investigator, an observer, an excellent teacher, and a great organiser. He wrote upon osteology, the nerves, the nutrition of the fœtus, and upon various points of comparative anatomy. His teaching appears to have been as sound and broad as his knowledge.

He was the father of the medical school, which was initiated and which grew and prospered under his judicious guidance.

He was a far-seeing man, who possessed the power of persuading other people to accept his views, and to work with him for the accomplishment of his ideas. He lived and worked in the days of Cheselden, Winslow, François Petit, Albrecht von Haller, the father of Physiology, Lieberkuhn, and Camper, and he was a distinguished man in such distinguished company.

When he retired in 1758 he was succeeded by his son, Alexander Monro, secundus.

Monro, secundus, like his father, was trained, during his early years, under the most distinguished teachers of his time.

He was contemporary with William and John Hunter, Caspar Friedrich Wolff, J. F. Meckel, Tenon, Bichat, Cloquet, and Vieg. d'Ayzr.

He lived in a time of great men, and held place amongst the highest. He was an anatomist in the widest sense of the word, and by his work and his writings he helped his contemporaries to still further extend the boundaries of anatomical knowledge.

He wrote upon seminal fluids, the brain, and the sense organs, and he compared the anatomy and physiology of fishes with the anatomy and physiology of man.

He was a greater scientist, he appears to have been a more brilliant teacher than his father, and he increased the already great reputation of the school.

In 1798 he was succeeded by his son, Alexander Monro, tertius, a man who was well and widely educated, who possessed the scientific type of mind, and who established the nucleus of the Anthropological Section of the University Anatomical Museum. He was particularly interested in Pathology, and his writings upon that subject are said to have been of considerable importance; but he seems to have been unable to arouse any enthusiasm for the study and teaching of Anatomy, and his publications dealing with pelvic anatomy and the anatomy of the brain do not rank so high as the writings of his father.

It was during his tenure of the Chair that the science of Embryology was placed upon a firm basis. Its fringe had been touched by Aristotle and Galen, and it had been placed on a better footing by the researches of Fabricius at Aquapendente and Swammerdam, but it was raised to a definite and satisfactory position by the work of Pander, von Baer, Coste, Martin, Barry, Wharton Jones, Rathke, and Allen Thomson.

In 1827 von Baer discovered the human ovum, distinguishing it from the other contents, Graafian follicle, with which it had previously been confused, and he laid the foundation of the knowledge of germinal layers, which afterwards played so important a part in the discussions of anatomists and pathologists. Allen Thomson described the formation of the aorta from two primitive tubes in 1830, and the observations of embryologists were tending, on the one hand, to discredit the theory of preformation, which had so long held sway, and, on the other, to support the theory of epigenesis, propounded by Wolff in 1759, in which he asserted that the parts of the adult were not preformed in the germ, but were developed from a structureless blastema, as development and growth proceeded after they had been initiated by the contact of the seminal fluid with the ovum.

It was also during the period Monro, tertius, occupied the Chair of Anatomy, in 1839, that Schleiden and Schwann proved cells to be the units of structure of vegetable and animal tissues, and so laid the foundation of the great offshoot of Anatomy known as Cytology, which has become so important during later years. At the same time Charles Bell was prosecuting the work which led to the discovery of the functions of the roots of the spinal nerves, and to the explanation of many of the functions of the nervous system which had not been previously understood.

In 1846 Monro, tertius, was succeeded by John Goodsir, a man of very different calibre. Goodsir was a great anatomist, a philosopher, and an excellent teacher. His knowledge of Anatomy, Physiology, Pathology, and Embryology was profound. He was a careful and capable investigator, who ever sought for the truth, and he expressed his opinions and recorded his observations in clear and definite words. His writings show that he was thoroughly acquainted with the work of his predecessors and contemporaries, and he was able to expound to his students the soundest principles of his subject and the most recent theories regarding the questions under discussion in his day. He wrote upon the vertebrate skull, the development of the teeth, cellular pathology, the placenta, the movement of joints, and many other subjects of anatomical importance.

During the period Goodsir occupied the Chair, Anatomy, Embryology, and Comparative Anatomy were making enormous progress, aided by the work of Jones and Richard Quain, Allen Thomson, Burns, Harrison, Todd, Bischoff, Rathke, Arnold, Reichert, Meyer, and Richard Owen.

In 1867 John Goodsir was succeeded by his chief demonstrator, William Turner.

With Turner's work as a teacher, anatomist, and organiser you are all familiar, or will rapidly become familiar. His writings upon the skeleton, the placenta, the pelvis, the cranium, the cetacea, and other subjects of anatomical and anthropological importance are classical. The buildings and arrangements he has initiated, created or helped to create, surround us; we shall proceed in our onward course aided by the advantages which are due to his foresight, energy, and determination. His influence as a teacher of Anatomy may be gauged to some extent by the fact that his pupils hold, or have held, the Chairs of Anatomy in Edinburgh, Glasgow, St. Andrews, Newcastle, Manchester, Liverpool, Cardiff, Oxford, King's College, London, Dublin, Belfast, Melbourne, Sydney, Montreal, and Toronto. I know no other such record.

During his tenure of the Chair the new buildings were erected, the present magnificent dissecting-room and museum were built, and the value of the museum was enormously increased by the specimens he secured and arranged.

When he resigned the Chair in 1903 to take up the more important duties of Principal, Daniel John Cunningham was appointed to succeed him. Unfortunately, Cunningham was destined to hold the Chair for only a very short period, and his untimely death has taken from the University the one man who was best fitted to occupy the Chair of Anatomy after his teacher. Most of us have known him as teacher or colleague, and to everyone who knew him he was a friend. Everyone who came into contact with him fell under his kind and stimulating influence. He was slow to blame, though strong to correct when correction was necessary; quick to sympathise and help, he encouraged everyone to his highest level, and got the best from each and all. He was conversant with all parts of his own and allied subjects, he was an indefatigable worker, a lucid writer, and a stimulating and impressive teacher. He published works upon varied subjects: the spinal column, the muscles of the hands and feet, the brain, and the stomach rank amongst the highest, and his text-book and manual are in use in all English-speaking countries. In addition, he was a magnificent organiser. His death has deprived the University of one of its most distinguished men, and it has deprived anatomists of a leader who was admired, respected, and loved by all who came into contact with him.

In the past 200 years all branches of Anatomy have made more progress than in any previous time. Improved methods and improved instruments have enabled an army of observers and experimenters to obtain results never dreamed of in earlier days, and the occupants of the Chair of Anatomy have ever kept themselves in touch with the more important parts of the rapidly growing subjects, and have transmitted to their students a knowledge of all the important facts.

There is little doubt that if the anatomists of the latter part of the eighteenth and the early part of the nineteenth centuries could return to-day, they would be amazed by the amount of knowledge which has been accumulated since their time, just as our great-great-grandfathers would probably be amazed and appalled if they were suddenly placed to-day in the midst of a large commercial city amongst rattling electric cars and tooting motors, whilst we who grow up amidst widening knowledge and its utilisation absorb the knowledge as we grow as easily as our ancestors acquired the more limited knowledge of their day.

In Sir Alexander Grant's *History of the University* it is stated that Dr. John Barclay, who taught in the Extra-Mural School during the time of the third Monro, and who was a distinguished anatomist, an incisive critic, and a brilliant exponent of his subject, classified anatomists up to his time in three groups. First, the reapers who entered into a full harvest and gathered in the sheaves. They were the pioneers. Second, the gleaners of later days who secured a few heads of corn left by the reapers; and third, the geese of his own day, who might hope to obtain by diligent search a few grains of corn amongst the stubble. Could John Barclay return to-day, he would, no doubt, in his critical and uncompromising manner, confirm the classification of himself and others who have expressed similar short-sighted opinions, but for reasons very different from those which misled him in the early part of the nineteenth century.

If it were necessary to prove that human anatomy, even as regards its merely descriptive portions, is not the fixed science many unobservant people are inclined to believe it to be, I might point to the fact that even to so comparatively a recent period as ten years ago it was the custom to depict the human heart very much in the form made so popular by the old-fashioned valentine. Yet such representations, which induce their observers to believe that the blood flows into the heart from above, runs downwards

from the auricles to the ventricles, and is ejected upwards into the arteries, are far from correct, so far at least as the human heart is concerned, and the long persistence of such figures is due, not to the fixity of anatomy, but to the absence of proper fixation of the subjects from which the specimens used for illustration were obtained. The figures possibly represent, more or less correctly, the conditions met with in quadrupeds, but with the assumption by man of the erect posture the human heart has changed its form and position. It is not a simple but an irregular cone, into the back part of which blood flows both from above and below, then runs forwards, not downwards, from the auricles to the ventricles, before it is ejected upwards and backwards into the arteries. Whilst a knowledge of the true form of the heart has only been gained in comparatively recent times, a proper conception of the shape and size of the stomach is a still more recent acquisition, and has been provided by the observations of Cunningham and Waterston. The pear-shaped, evenly-curved, and complacently rounded organ represented in many illustrations, if it belongs to us at all, only comes into our possession after death, whilst the actual shape of the organ we carry with us for daily use varies from time to time with the amount of food it contains, the stage of digestion, and the condition of the surrounding organs. You will find, in the bone-room, casts which illustrate, in a most accurate manner, various different shapes the organ may assume. If our conception of two well-known organs has been materially changed in recent times by the use of improved methods, who shall say that still improving methods will not further advance our knowledge in the near future.

Systematic Anatomy is still moving forward, and in the case of Comparative Anatomy a mere enumeration of the names of the investigators who have added to our knowledge of the subject in the period under consideration would occupy more time than is at my disposal. Originating in the earliest days of Anatomy as a definite department, it was first placed on a satisfactory footing by Cuvier, in the latter part of the eighteenth and the early part of the nineteenth century. Its position was strengthened by the work of J. F. Meckel, Johannes Müller, Siebold, Stannius Owen, and Milne-Edwards, and it has been further extended in more recent times by Gegenbaur, Dohrn, Huxley, Turner, Wiedersheim, Cope, D. J. Cunningham, Parker, Agassiz, Ray Lankester, Osborne, and numerous other distinguished men. The consideration of the more philosophic side of the subject originated by Oken and

Goethe was greatly expanded by Lamarck, whose publication of his *Philosophie Zoologique* in 1809 initiated the theory of descent, which has since been carried to wider and surer ground by Huxley and Darwin.

The growth of Histology and Cytology has not been less vigorous than that of Systematic and Comparative Anatomy. The details of the anatomy of cells, known to Schwann, Remak, and Goodsir, now constitute the gross anatomy of those bodies.

In 1840 Schwann recognised three parts in a typical cell: a vesicular cell body; a vesicular nucleus enclosed in the cell body, and enclosing a vesicular nucleolus. He believed that cells were deposited in a structureless or slightly granular blastema, somewhat in the same way as crystals—first the nucleolus, then the nucleus, and last the cell body.

The falsity of his opinions regarding the origin of cells was discovered in 1851, when Remak proved that cells rose from pre-existing cells, a fact succinctly summarised by Virchow's famous aphorism, "Omnis cellula e cellulâ"—an aphorism which tells part but not the whole of the truth, for about two years after Remak's discovery Kölliker and Richert showed that the spermatozoon was also a cell, and that the union of ovum and spermatozoon was necessary for the initiation of a new individual of the higher forms; whence follows the possibility that every cell of an animal body may contain parts, not of one, but of two, originally separate cells.

We still say that every animal is developed from one cell, the fertilised ovum—a term which is retained partly from custom and partly for convenience, though it fails to clearly express the fact that the fertilised ovum is really a compound of two cells.

The importance of the conception of the fertilised ovum as a compound organism began to be increasingly apparent in 1873, when Anton Schneider drew attention to the remarkable changes which take place in the cell nucleus previous to the division of the cell into two parts. Since 1873 the researches of Flemming, Fol. Ed. van Beneden, Butschli, Boveri, Oscar Hertwig and many other observers have shown that Schwann and Remak had a very incomplete idea of the constitution of a typical cell. Fresh methods of fixation and staining in the hands of skilful workers have shown that each cell consists of a substance called protoplasm—Huxley's "physical basis of life;" that the protoplasm itself possesses a complicate structure, and that there is embedded in the cell substance not only the nucleus but also a body called a centrosome,

which appears to function as a presiding genius when cell division is about to take place.

It has also been shown that the nucleus is not a vesicle, but that it consists of protoplasm which possesses a very definite structure, and which is easily separated into two parts—one stainable, the chromatin; and the other unstainable, the achromatin. The researches of the investigators previously mentioned, and others too numerous to mention now, have gradually produced the conviction that the chromatic substance of the nucleus is the repository of the inherited capabilities of the cell. There is also strong reason for believing that when the spermatozoon and ovum unite, the chromatic character bearing particles of the two do not blend, but are merely associated together, from which follows the possibility that the cells derived from the fertilised ovum may contain particles of the chromatic substance of one or the other or both parents. Here is a most interesting anatomical question which still awaits a definite solution.

Beyond the general details of cell structure to which I have referred, our knowledge of special features of the anatomy of certain groups of cells, and particularly the anatomy of the cells of the nervous system, has been revolutionised during recent years by the skilful experiments and observations of Golgi, Weigert, Bethe, Nissl, Raymon y Cajal, Retzius, Heidenhein, Apathy, and other investigators.

The advance of Embryology has been no less marked than that of other departments of Anatomy. Year by year the knowledge of the general and special features of the development of particular animals and groups of animals, including man, has been widened and made more exact by the work of Balfour, Dohrn, Kölliker, Beard, Selenka, Strahl, Bonnet, His, Hubrecht, Zeigler, Waldeyer, Bryce, and a growing army of other investigators. In the domain of experimental embryology the researches and experiments of Dreisch, Wilson, O. Hertwig, Loeb, and others have furnished remarkable results demonstrating the important fact that whilst the fertilised ovum contains inherited capabilities derived in the more or less distant past from innumerable ancestors, it can itself exercise but few of these capabilities. It can only divide into a number of cells, some of which, the germ cells, retain capabilities similar to those of their parents, whilst others become servants of the germ cells, and form, by repeated division, the bodies of the individuals in which germ cells are lodged, and by means of which they are placed in conditions favourable for the performance of their functions.

Nature is generous with, and very careful of, her germ cells; she places them in affluent circumstances as an aristocracy of descent—a kind of House of Lords, for which and from which she provides excellent servants, who can reproduce themselves by division, but who cannot, like the germ cells, enter into union with other cells of similar nature to produce new individuals possessing, possibly, improved capabilities.

Nature as revealed by Anatomy shows plainly that she has no belief in any general equality. She produces her children in myriads, casts them into the sea of circumstances, approves and helps only those who can swim, and rewards them according to their performances.

Had time permitted I would have liked to glance at the experiments and observations of Roux and Weismann, which tended to swing the pendulum of thought back from the epigenesis theory of Wolff toward, but not to, the preformation theory of Leeuwenhoek and Haller, for both Roux's mosaic theory and Weismann's elaborate conception of chromosomes and their subdivisions involve the belief not that every part of the adult body exists preformed in the germ, but that every inheritable quality of the body has its own representation in the germ substance. And it would have been interesting to examine, even in only a superficial manner, the later experiments of Dreisch and Loeb, and those of some of the followers of Mendel which appear to be swinging the pendulum again, and this time towards the intermediate opinion that the constitution of the germ is sufficiently complex to account for the limitation of the potentialities of some of the cells eventually derived from it, and yet sufficiently simple "to allow of the divisibility of the whole into totipotent parts." The riddle of life is not yet solved—

> "A hair, perhaps, divides the false and true,
> Yes, and a single alif were the clue—
> Could you but find it—to the treasure house
> And peradventure to the master too."

No one has yet touched the hair, no one has found the alif, but numbers have sought and will seek, and in the search some will find in the future, as some have found in the past, knowledge useful to mankind.

I have placed before you the merest outline of the history of Anatomy during the period of the existence of the Chair of Anatomy in Edinburgh, and a similarly faint outline of the history of

occupants of the Chair. Counting from the appointment of Alexander Monro, primus, the Chair is not 200 years old, yet it and the school with which it is associated are amongst the most famous in the world.

Its students who have become graduates are scattered north, south, east, and west to the farthest corners of the habitable world, and wherever they are situated they gain respect and admiration, and prove themselves equal to all circumstances.

Their success is obvious, and the secret of it is not far to seek. You will have noted, even from the short and incomplete survey I have been able to place before you, the nature of the men who have occupied the Chair in the past—they have been of the type which carved out Britain's fortunes in the days of Elizabeth; men who, looking at a seed, could see gardens of flowers, or looking at a grain of gold could behold ridges and mountains of golden quartz, and the fleets and armies of commerce. They were men also who could persuade others to help them to realise their visions. Their knowledge was at the same time precise and broad, their views were broad, their foresight great, and there is evidence to show that their teaching was adapted to inculcate broad principles and accurate knowledge.

They appear to have taught with the conviction that it was essential that every medical graduate should have a precise and accurate knowledge of the human body, as a living object with which he would have to deal under varying circumstances, and with the added conviction that every properly educated medical man should have a sound grasp of the principles of Anatomy and its relation to allied subjects. Their views of a proper education have permeated the School, with the result that its graduates are not merely technical experts able to deal effectively with things they have seen and done before, but men endowed with a knowledge of the broad general principles on which Anatomy and the allied sciences rest, as well as with a knowledge of concrete examples, and consequently men capable of dealing effectively with circumstances as they arise, whether those circumstances are familiar or not.

The occupiers of the Chair of Anatomy have always avoided the disastrous plan of sacrificing the exception to the rule; they have taught on lines which have given encouragement, scope, and inspiration to all, and the results have proved the wisdom of their principles and methods.

Our quest, therefore, is gained. The previous occupants of

the Chair of Anatomy worked with the belief that in a proper education a sound knowledge of general principles was required, and that a detailed knowledge of particular examples was essential for special purposes.

If we accept their views of the importance of general and detailed knowledge, and adapt our plans to the circumstances of to-day, we shall have reason to hope that we shall be able to carry on our predecessors' work, and obtain, as they did, successful results.

Before concluding, let me say a few more words directed to those who are to become but are not yet graduates of Medicine, and more particularly to those who are in the early stages of undergraduateship. I have sketched for you the broad outlines of the progress of Anatomy to show you that the subject is living and vigorous. Now let me say that whilst it is important for your own welfare and position that you should have a wide knowledge of broad general principles upon which Anatomy and the allied sciences rest, so that you may be able to hold place with other well-educated people, it is your *duty* to acquire a precise and accurate knowledge of the human body, the organism with which you are to deal in your daily lives. On that knowledge will some day depend happiness or disaster; life or death. You must train your eyes and hands to know each and every part, so that when the critical moment comes you will not have to think —you will be able to do.

As Medicine and Surgery advance, the knowledge of human anatomy becomes more and more important. Thirty years ago it was sufficient for practical purposes if the physician or surgeon had a good general knowledge of the forms and positions of the abdominal and thoracic viscera. Now that both cavities can be opened not only with impunity, but with the most successful curative results, it is essential that you should know every organ intimately both by sight and touch. Moreover, it is necessary, in some instances, that you should know not only the normal position of an organ, but the other positions it may occupy as a result of incomplete development.

A few years ago the smaller details of the arterial and lymphatic arrangements of the abdominal part of the alimentary canal were of little practical importance for the canal was almost inaccessible for operative purposes. To-day it is frequently operated upon, and unless you know the details of the arteries and lymphatics you may apply a ligature which may cause the death

of your patient, or you may leave an infected gland which might have been removed, and so fail to save a life that was in your hands.

In the years when conservative surgery was less practised than now, so far as the limbs were concerned, it sufficed to know the positions of the main arteries and nerves and the general arrangement of the tendons and muscles. It is not so to-day. How little it is so can perhaps be illustrated best by an account of a case brought to my notice a short time ago by a distinguished surgeon in a large town, who was once a prosector here and afterwards my colleague as demonstrator of Anatomy in Manchester.

The manager of an estate in the East had the misfortune to fall on a large knife, which cut through all the structures in the front of the lower part of his forearm to the bone. The local practitioner only ventured to tie the arteries, then he sent his patient down to the coast. The wound sloughed, and the medical men at the coast sent the patient home. When he arrived the wound had healed, and in its place was a mass of scar tissue, in which the nerves and shrunken tendons were embedded; the hand was useless, incapable of movement, and on its palmar aspect devoid of sensation. Not many years ago such a useless hand would have been amputated. It was decided to try and save it. The scar was opened up, the ends of the tendons and nerves dissected out, but it was found they had shrunk so much that they could not properly be brought together, therefore portions of the bones were cut out to shorten the limb. The bones, tendons, and nerves were united respectively end to end; healing took place, and now sensation and movement are returning, and there is every probability that the patient will regain the full use of his hand. Such an operation could not have been performed without the possession of a most accurate knowledge of Anatomy. I might continue indefinitely with examples emphasising the growing importance of human anatomy, but will mention to you only one more, which illustrates the necessity of a knowledge of abnormalities or variations. Some day one or other of you will have a patient who will complain of pain along the inner side of the arm, forearm, and hand, or one or other of those areas, and possibly of growing weakness of the muscles of the thumb and little finger. You will probably think of many causes for the symptoms, but if you know your Anatomy properly you will think, amongst others, of the possibility of an additional rib at the root of the neck pressing on the nerves passing to the arm.

Those of you, then, who intend to become competent medical men must know your human anatomy thoroughly, and you must also understand the general principles upon which the structure and functions and development of the body are based.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH, ROYAL COLLEGE OF SURGEONS OF EDINBURGH, AND FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.

THE Quarterly Examinations of the above Board, held in Edinburgh, were concluded on 16th inst., with the following results :—

The following candidates passed the First Examination :—Abraham Isaac Clarke, Belfast; James Johnstone Dykes, Dumfries; George William Fleming, Omagh; Dhunjibhoy Bomanji Cama, Bombay; Richard Bridge Lilly, North Shields; Christopher Robert Cecil Moon, Derby; John Warden, Bangor; Ampattu Thomas Kuriyan, Travancore; Patrick Edward O'Donoghue, India; George Boyle Hanna, Tildarg; Frederick William Crowther Hinings, Bromyard; James Joseph Reynolds, Co. Cork; and Oswald Brunlees, Roehampton; and 3 passed in Physics and 2 in Biology.

The following candidates passed the Second Examination :—George Anthony Macvea, Whithorn; Marcel Francois Auguste L'hoste, Mauritius; Gerald Irwin Secluna, Burma; Stanislaus Brennan, Co. Clare; John Nichol Clark, Yorkshire; Thomas Hardie, Glasgow; and Solomon David Bridge, Glasgow; and 2 passed in Anatomy and 10 in Physiology.

The following candidates passed the Third Examination :—Eustace Thorp, Belfast; Emma Christiana Rolfe Fisher, London; James M'Manus, Belfast; Edward Charles Hamilton, Chicago; Cyril Scotter Owen, Hale; James Douglas Wright, Coatbridge; John Moir Dalzell, Anstruther; and James Anderson Hutchinson, Co. Derry; and 1 passed in Pathology and 7 in Materia Medica.

The following candidates passed the Final Examination, and were admitted L.R.C.P.E., L.R.C.S.E., and L.F.P.&S.G. :—Frederick Bernard Carvalho, Poona; Raghunath Anandrao Barve, Bombay; Richard Denis Neagle, Cardiff; Harold Henry Field-Martell, Australia; Martin Remers, Manchester; Anthony Francis Henriques, Bombay; Kuppusami Tirumeni Nath, India; Reginald Andrew Hosegood, Swinton; William Rich M'Kenzie, Ireland; Sydney Sharples, Preston; Beatrice Coxon, Northumberland; George Bassett Moon, Derby; Rupert Vincent Dias, Ceylon; Dinshaw Bhicaji Gazdar, India; Maud Tresillian Féré, New Zealand; Howard Vivian Alexander Gatchell, Ireland; and Fritz Charles Iberhardt, England; and 3 passed in Medicine and Therapeutics; 7 in Surgery and Surgical Anatomy; 9 in Midwifery; and 21 in Medical Jurisprudence.

THE INAUGURAL LECTURE TO THE CLASS OF SURGERY IN THE UNIVERSITY OF EDINBURGH.[1]

By ALEXIS THOMSON.

GENTLEMEN,—I need hardly confess to you that I am deeply conscious of the responsibilities which rest on my shoulders in undertaking the duties of the Chair of Surgery in this great University. I am emboldened, however, by the encouragement which I have always received from my esteemed teacher, our well-beloved and venerable Principal, Sir William Turner; I rely upon the loyalty of my colleagues in the Senatus—some of them my former teachers, a sadly diminishing number, some of them my former fellow-students, and among these I am proud to include the new Dean of the Faculty of Medicine. Upon you, gentlemen, I can surely depend for a continued display of those virtues which are so stimulating to the teacher, and which have always characterised the students of this University.

I have approached, with diffidence, the task of addressing you on this occasion, and of selecting a subject which would be appropriate both to it and to you who are the members of my class. I purpose, in the first place, to tell you of my predecessors in the Chair: I shall then attempt to sketch for you the evolution of surgery, and, finally, I shall refer to certain lines of research by means of which the science and art of Surgery have been promoted in the past and by means of which they are most likely to be advanced in the future.

History of the Chair.—The Chair of Systematic Surgery in the University of Edinburgh is of comparatively recent foundation. From 1777 until 1831 it was held conjointly with that of Anatomy, and the holders of the combined Chair were the second and third Monroes, regarding whom my colleague, Professor Arthur Robinson, discoursed in this hall on Friday last. The first Professor of Surgery, John William Turner, only held the Chair for five years. He was succeeded in 1836 by Sir Charles Bell, whose reputation is secured for all time by his physiological observations. He, in his turn, was succeeded by James Miller (1842), an eloquent lecturer, the author of one of the standard works of his time on the *Principles and Practice of Surgery*, and an enthusiastic advocate of temperance. His son, Mr. A. G. Miller, is still with us,

[1] Delivered in the M'Ewan Hall, October 4, 1909.

and is one of the consulting surgeons to our Royal Infirmary. There followed James Spence (1864-1882), an accomplished anatomist, a careful and painstaking, yet dauntless surgeon, the author of two volumes entitled *Lectures on Surgery*, in which he gave to the professional world of his day and generation the practical conclusions of a skilful and experienced hospital surgeon. It so happened that the first operation I was permitted to witness in the Royal Infirmary was performed by Mr. Spence. It was for the removal of the entire tongue, and necessitated the division of the lower jaw. At the time and under the circumstances I was naturally more impressed by the accompaniments of the operation as they affected the patient—his life, as it were, hanging in the balance—than by the skill exhibited by the surgeon. On looking back upon it, however, I realise that it was most admirably performed. The conservative mind of James Spence did not permit of his taking part in the revolution in surgical practice which was initiated during Lister's occupancy of the Clinical Chair, and this doubtless prevented his really great ability and achievements continuing to receive the recognition and appreciation which they undoubtedly deserved.

Of his successor, John Chiene (1882-1909), it is not easy for me to speak without apparent presumption. My knowledge of him goes back twenty-six years, when I was one of the 300 students in his class. I still regard myself as a student of the doctrines which he taught so well, and I hope to retain the imprint of his teaching and example all the days of my life. Since he was appointed Demonstrator of Anatomy, under Goodsir, forty-three years ago, he has been a living force and a tower of strength in this Medical School and University. As a teacher he could always reach the hearts as well as the intellects of his audience. While he was the most approachable and human of professors, no student ever presumed upon these qualities; his appearance in the lecture-room or in the operating theatre caused the buzz of conversation to cease as if by magic, and the earnestness of his rugged eloquence made the most thoughtless of his hearers realise the seriousness of life, the responsibilities of the study of medicine, and the supreme importance of the subject under discussion. With Chiene, teaching was a religion, and he gave his life to it; out of the most unlikely material he could evolve in his own mind and convey to his audience the fundamental principles and truths of surgery in a manner that was peculiar to himself. He was able to rivet and maintain the attention of his audience by the employ-

ment of a number of appropriate illustrations, drawn from a great variety of sources—some from the collateral sciences, some from well-known facts or striking events, while not a few were whimsically picturesque in their adaptation to the subject of discourse. His aim in lecturing was to teach truth without dogma, to stimulate his hearers to draw inferences of their own, and to foster an aptitude for the investigation of new facts or theories. To his students he was the kindest and most considerate of professors; to his assistants and co-workers he was generosity and unselfishness personified, setting thereby a standard of conduct to which it will be for me impossible to attain but which it will be my privilege and endeavour to imitate. His scientific work is too near us to be appraised at its permanent value. His contributions to Anatomy will serve to keep his memory green in the years to come: his book on *Surgical Anatomy* has become a classic. His papers on "Healing by Blood-Clot," on "Wound Drainage," on "Colles's Fracture," on "The Treatment of Knock-Knee" (published in 1878, in which he described the operation which is now revived as the best for its purpose), on "Drainage of the Bladder," and on "Retropharyngeal Abscess;" these, gentlemen, are a few of his original and best known contributions to the science and practice of Surgery.

In concluding this brief and imperfect appreciation of my immediate predecessor in this Chair, I take it that we have reason to honour him, firstly, for the influence which his teaching and example exercised over the thousands of students who have passed through his classroom and wards, and, secondly, for the service he rendered to surgery in promoting the acceptance of the Listerian doctrine. In the Edinburgh of "the seventies," Chiene was universally recognised as the most ardent and most faithful disciple of Lister.

There have always been good teachers of Surgery and brilliant operators in this Medical School, but at the critical period when the science of Surgery was being revolutionised it was a fortunate thing for Edinburgh to have, first as extra-mural lecturer, and then as professor in the University, a man with the moral force, the strength of character, enthusiasm and determination of John Chiene.

I shall now give you a brief *résumé* of the

Evolution of Surgery.—The Surgery of the present, like every other department of human knowledge, is the product of evolution, and has culled from every source that which would contribute to

its advancement. It has shared and will always continue to share the progress of other branches of science. As it is with Surgery so it is with surgeons; "we are all children of our fathers; what we are is in part only of our own making; the greater part of ourselves has come down to us from the past."

In the earliest times of which we have any record the universal prevalence of war and of fighting created a demand for the services of a class of men who would now be described as surgeons, for they were regarded as necessary to heal the wounded; whether they were of any service in this direction, or whether their value was purely sentimental, is a matter on which I am not called upon to express an opinion. It is interesting in this connection to remember that Sir James Y. Simpson, in one of those admirable papers on subjects outside his own specialty, for which he was so remarkable, entitled "Was the Roman Army Provided with Medical Officers?" was able to prove, from monumental tablets, that the Tungrian Cohort, forming part of the army which invaded Britain, possessed a medical officer who was known as the *Medicus Legionis.*

In the days of the Assyrians, the Egyptians and the Greeks, Medicine and Surgery were combined in the teaching and practice of all professors of the healing art; the progress of the one necessarily contributed to that of the other, and both profited from the esteem in which learning was held among those cultivated races. In the dark and middle ages, Medicine and Surgery were divorced from one another, and this not only crippled the progress of both during a long series of centuries, but was especially fatal to the advance of surgery and the status of surgeons. The physician was a man of education, who, if he did little to advance his calling, at any rate did not allow it to lose caste; the art of the surgeon, on the other hand, was allowed to fall into the hands of the profane and vulgar, and the shedder of blood came to rank with the humblest of craftsmen.

Up to the end of the fifteenth century very little had been done to mitigate human suffering, or to advance the public weal. It is the great merit of *Francis Bacon* that he led forth the sciences from their house of bondage, that he directed the minds of men away from mere verbal disputations to the discovery of truth by observation and experiment, and that he incited men to acquire knowledge and to apply it. With the revival of learning in the fifteenth, sixteenth and seventeenth centuries, Anatomy was developing into a science, Physiology was enriched (reign of

Charles I. 1619) by the discovery of the circulation of the blood, Medicine was practised by men of light and learning, Surgery remained very much as it had been in the dark ages. A new era dawned when John Hunter left the Lanarkshire farm in which he had been born and brought up, and joined his elder brother, William, in London, three years after the *débâcle* of the Stuart cause at Culloden. The span of his professional life in London is easily remembered, for he died on the same day and about the same hour that Marie Antoinette was beheaded in Paris.

It was Hunter who raised surgery to the dignity of a science, and who raised surgeons from the position of mere craftsmen to that of members of the educated classes. There were excellent surgeons before Hunter—sagacious, observant, practical men—by whose labours surgery was advancing in precision and utility, but the Surgery before his time was only empirical, and, in so far as it was a science at all, it stood alone; it was scarcely combined with Medicine, and, with the sciences related to Medicine, it had no affinity at all. Surgery and Physiology were far asunder; no one great mind had ever deeply studied both, and become conscious that the two were parts of the same science of living things. It was Hunter's greatest work in and for Surgery that he brought the scientific method into the study of the practice, and welded the lessons of experience with scientific knowledge. He showed the necessity of a surgeon being a student of Physiology, using that word in its widest meaning as "the science of the normal life of all things that live or have lived," as well as of Pathology, using this word to mean "the nature" or "the philosophy of disease." Never again since Hunter's day have the study and teaching of Surgery been dissociated from the sciences of Physiology and Pathology, and it is to advances in these essential branches of Medicine that the progress of Surgery in the first half of the nineteenth century is to be ascribed.

But discoveries were now on the threshold which were to revolutionise the healing art, and surpass the heritage of all the centuries that had gone before in the alleviation of suffering and the saving of human life. In the surgical amphitheatre of the Massachusetts General Hospital, on the 16th of October 1847, an operation was performed by John Collins Warren upon the patient, Gilbert Abbott, the latter having been placed in the sleep of ether *anæsthesia* by William Morton, a dentist in Boston. This was the first convincing public demonstration of artificial unconsciousness during a surgical operation, and from it dates the development of

anæsthesia, and the promulgation to the world of the glad tidings of what was described by Weir Mitchell as "the conquest of pain." The chief share in this honour belongs to Morton, but a large measure is also due to the surgeons of the Massachusetts General Hospital of that time, for they were largely responsible for the success of the experiment, and they materially contributed to the extension and acceptance of the new order of things. Surgical anæsthesia, which we owe to America (the word itself we owe to the gifted *Autocrat of the Breakfast Table*), is of all the gifts of science to mankind the happiest and the most easily appreciated; it has already earned the gratitude of countless sufferers, and will continue to do so in all the generations to come.

The name of our countryman, James Y. Simpson, will always be associated with the birth of anæsthesia, for he not only discovered the anæsthetic uses of the ever-popular chloroform, but he rendered memorable service in advancing the cause of anæsthesia by his marvellous powers of speaking and writing, and by the unlimited influence of his great reputation.

Anæsthesia has not only been of inestimable service in the prevention of human suffering, but, by rendering it possible to experiment upon animals without the infliction of pain, great advances were made possible in physiology and other sciences which can only achieve progress by experimental research, and these in their turn have yielded ever-increasing benefits to the human race.

It was in 1853 that the first paper was published by the man who was to reform the whole science of Surgery; I need hardly say I refer to Joseph Lister. The details of his life and work, and of the influence on both, of the researches of Louis Pasteur, are known to all of us, and have been made accessible in the two volumes of his *Collected Papers*,[1] published as a permanent memorial of his eightieth birthday, which was celebrated two years ago. While his early contributions dealt with physiological subjects, he soon grappled with problems concerning the lower forms of life, and he made researches from which was to be evolved the immortal discovery, that wounds do not inflame and suppurate if the access to them of living micro-organisms be prevented. His father was the inventor of the compound microscope, and those best able to form an opinion, aver that from him were inherited not only the scientific instincts, but also the graces of character which we so

[1] *The Collected Papers of Joseph, Baron Lister*, at the Clarendon Press, Oxford, 1909.

much admire in the son. It is one of the priceless possessions of our Alma Mater that it was during his incumbency of the Chair of Clinical Surgery in this University that he perfected the theory and practice upon which the antiseptic principle is founded. Before he left Edinburgh, Lister had the satisfaction of knowing not only that he had created a new religion in surgery, but that it was already in process of acceptance by the scientific world. In this connection we must never forget the splendid work of Lucas-Championière, who, on his return to Paris after visiting Glasgow and Edinburgh, by his teaching and example, did so much to promulgate the Listerian doctrine on the Continent of Europe.

When presented with the freedom of our city, Lister thanked the citizens for the honour they had done him, and with characteristic truth and modesty he summed up the work of his life in these memorable words: "I thank you from the bottom of my heart for your gracious words, for I must confess that highly, and very highly, as I esteem the honour which you have now conferred upon me, I regard that and all worldly distinctions as nothing in comparison with the hope that I have been the means of reducing in some degree the sum of human misery. And, if I am not presumptuous in indulging this hope, I share it with the humblest practitioner who discharges to the best of his ability the sacred duties of our noble profession."

A century which was made memorable in the history of medical science by the discovery of anæsthesia and by the researches of Pasteur and Lister, was also remarkable for the work of the great German pathologist, Virchow, and his pupils, who laid the foundation of cellular pathology, and focussed the ideas of men of science on the *rôle* of the cell in health and disease.

Research was now being prosecuted on fruitful lines in all centres of learning, but the most brilliant, and, next to those of Pasteur and Lister, the most fruitful in the benefits they have conferred on mankind, were those of Koch. He revealed the true nature of the infective diseases, most important of all the bacillary origin of tuberculosis, and he opened up broad avenues of prevention and cure, for he showed not only how these diseases were caused and propagated, but also how their sources might be combated and eliminated. It is almost entirely due to the discoveries made in this department of knowledge during the last thirty years that medical science has come to be recognised as a worthy object of public and private endowment, and that there

have sprung into being those fountain-heads of research—the Institute for Infectious Diseases in Berlin, the Pasteur Institute in Paris, the Imperial Institute for Experimental Medicine in St. Petersburg, the Lister Institute of Preventive Medicine in London, the Rockefeller Institute in New York, and in our own city the Laboratory of the Royal College of Physicians, and the John Usher Institute of Public Health. "Impressive and encouraging as is this remarkable growth within recent years of laboratories devoted to medical science, no one who has any knowledge of the vast field to be covered, of the difficulty and complexity of the problems, of the expenditure of money required, and of the returns in increased knowledge and benefits to mankind which have been attained, and which may be expected in increasing measure, can for a moment suppose that the existing opportunities, considerable as they are, are adequate to meet the present and the future needs of scientific medicine."[1]

It is not too much to say that, great as has been the moral, intellectual and social progress of the world during the past century, there is no advance which compares in its influence upon the happiness of mankind, with the increased power to lessen physical suffering, and to control the spread of pestilential diseases. This is not the time or the place to rehearse the victories of preventive medicine, but I wish to emphasise the important deduction, which applies to surgery as to other branches of the healing art, that it is only by work on scientific lines that any real progress is to be made, and that it must ever be the aim of those who have the interests of our universities and colleges at heart to foster the spirit of research in our students, and especially in our graduates, and ever seek to provide greater facilities to enable such research to be undertaken. We, as a profession, do not grudge the large expenditure which is required to maintain the naval and military forces of the Empire, nor the providing, in old age, for those who are unable or have honestly failed to provide a competence for themselves, but we do desire that, in the huge expenditure with which the country is charged, that more should be forthcoming than the beggarly pittance at present granted for the advancement of those sciences on which the health and happiness of the people so much depend.

In commencing the study of Surgery, gentlemen, I wish you clearly to understand that you are not embarking like travellers

[1] William Henry Welch. "The Benefits of the Endowment of Medical Research." *Rockefeller Institute Reprints*, vol. vi.

on an expedition into an unknown country. Surgery is not a separate or independent branch of Medicine. The country through which you will be guided is the same as you have already been traversing, viz. the human body, and you will find that the means of exploring it are similar to those you have already learned to employ. *You* will succeed best who have acquired a sound knowledge of what are misleadingly called the preliminary sciences; they ought to be called the fundamental sciences, for they bear on the study of all the phenomena of living things. You have studied Chemistry, Physics, Biology, Anatomy and Physiology, and you may, I sincerely trust you have, satisfied the examiners with your knowledge in those subjects; but I must impress upon you that you are not done with them; you are to take them with you and apply them to the study of medicine and surgery. No real success in the study of surgery can be attained by one who is ignorant of these sciences. Let me remind you that John Hunter worked for years at Biology, Comparative and Human Anatomy, and Physiology, before he made those observations by which he enriched Surgery for all time. Lister, as I have endeavoured to show, could scarcely have succeeded in his struggle against sepsis had he not been well grounded in Chemistry, Physiology and in the use of the microscope. Times have changed from the days when surgeons thought they could neglect Physiology, and did not concern themselves with it. The student of Surgery, as well as the surgeon, must not only know the structure of the human frame, but must also know its functions and how these vary and may be altered by external influences. The student must lay the foundation of his knowledge of Anatomy in the dissecting-room, his knowledge of Physiology in the laboratory, and his knowledge of Pathology in the post-mortem theatre. The surgeon, on the other hand, while he may probably revisit the dissecting-room from time to time, must perfect his Anatomy in the living subject, must continue to work at Physiology and Pathology in the laboratories for experimental research. For him, the study of the dead must give place to the study of the living. The study of the dead is essential to the student; he who is engaged in the practice of the healing art and is seeking to advance it must study the living, for it is only the living that can respond to the influences which it is his duty to investigate. Most of the advances which have been made in Surgery have been made possible either by the surgeon himself having a knowledge of Chemistry, Physics, Physiology and Pathology, or this essential has

been supplied by a co-worker, the knowledge of the one permitting of the creative work of the other.

I have referred to the fact that the surgeon occasionally revisits the dissecting-room, chiefly with the object of obtaining a view of some region of the body in which he is about to perform an operation which he has never performed before, or which he proposes to undertake on different lines from those previously followed. The anatomist of the present day has been known to visit the operating theatre. After repeated observations on the position, size and shape of a particular organ in the dead, he has been known to be seized with a desire to see the organ in the living subject, and it has been my privilege in the course of an operation to afford the anatomist such opportunity. The debt of surgery to anatomy is enormous, and the surgeon is only too glad to pay back even a small part of it.

It is significant of the trend of modern teaching that, in the new *System of Surgery* edited by Keen, the first chapter should be entitled, "Surgical Physiology;" it is from the pen of George W. Crile, Professor of Surgery in Cleveland, who has made a special study of the physiology of the circulation and respiration as it applies to the emergencies which occur during operations. He very truly says that there is scarcely a diagnosis made, or an operation performed, that does not draw heavily upon the surgeon's store of physiologic knowledge. He lays stress on the surgeon being familiar with accurate methods of estimating the blood-pressure as being of more value than simply gauging this by feeling the pulse. He has shown us, in the condition of lowered blood-pressure, which we call shock, that in addition to the head-down posture and bandaging the extremities over cotton-wool, how the pressure may be raised by a pneumatic rubber suit, which, when inflated with air, compresses the superficial blood-vessels and materially raises the blood-pressure.

August Bier, the Professor of Surgery in Berlin, is another example of a man who has advanced surgery and the whole field of medicine on physiological lines. To him belongs the credit of having put the treatment of inflammation upon a scientific and rational basis. He has made us realise that the circulating blood is one of the most powerful factors in combating and getting rid of the injurious influences to which the body is exposed. When, for example, the surface of the skin is exposed to heat, so as to cause a burn, the capillaries of the skin, which are normally far from filled, become engorged, and the skin turns red. This is the

attempt of the body to protect the injured part, and to furnish increased nutriment to the damaged tissues. Similar work is done by the blood in infective processes; for example, in a poisoned finger, there ensue the phenomena of what we call inflammation. We used to deplore the redness, swelling and heat which attend upon this; now, in the presence of infection, we admire them; they mean that the blood is fighting against the invading foe, while the disappearance of the inflammation is due to the victory of the blood over the infecting agents. The principle of Bier's treatment of infective conditions by means of hyperæmia is based on Nature's method of cure. Where the beneficent hyperæmia is insufficient, it is increased artificially by a rubber bandage, a suction bell, or a hot-air chamber. The treatment seeks to increase the redness, the swelling and the heat—three of the classical symptoms of inflammation. This beneficent flow of blood to the injured part was unconsciously promoted by our forefathers by the application of hot fomentations and poultices, and must, on no account, be combated by ice-bags and the like.

Chronic disease, according to Bier, is chronic because the exciting cause is unable to provoke an active hyperæmia. If we can produce artificially a greatly increased flow of blood through the part, the chronic element disappears, and a cure is inaugurated. I have instanced the researches of Crile and of Bier as being the best examples of those which have been prosecuted on physiological lines. I need hardly add that there are many others.

From the joint labours of workers in different fields of medical research has arisen our knowledge of the important functions of *the peritoneum*, in cutting short abdominal infections, and in minimising their effects. Its remarkable capacity of inhibiting and destroying disease-causing factors has doubtless been acquired by evolution, and attains its acme in the pelvic peritoneum of the female, and explains in part the extraordinary successes achieved by abdominal surgeons, even by those who, professed unbelievers in the technique of Lister, neglect those refinements of wound technique which would result in disaster if they operated under similar conditions in other tissues and regions of the body.

Appendicitis, although it has caused a vast amount of suffering and the loss of many valuable lives, has permitted of observations which have been an important factor in building up our knowledge of the physiology of the peritoneum, and has led to the introduction of two important therapeutic measures which, primarily employed

in dealing with appendicitis, have been found to be of great value in all peritoneal infections. In the presence of peritonitis, that dreaded disease in which, but a few years back, the patient was condemned to lie on his back, without moving, it has been shown that the best attitude is to sit bolt upright in bed, an observation we owe to Fowler of New York, of whom it is sad to relate that he himself was cut off in his prime by the very disease to the treatment of which he had contributed so much. The other is the continuous introduction of salt solution into the lower bowel as a means of counteracting collapse, whether from loss of blood or from septic intoxication—a therapeutic measure of great utility we owe to J. B. Murphy of Chicago.

One of the most interesting and valuable pieces of joint work in recent years by physiologist and surgeon is that by Head and Sherren on the *Functions of the Peripheral Nerves*. Most worthy of your attention is the experiment in which Henry Head submitted himself to an operation in which portions of the sensory nerves of his arm were resected in order to elucidate problems which were of such difficulty that it was essential that the patient should be a reliable and trained observer and imbued with the physiological instinct. Investigations were made every week-end, in a secluded room in St. John's College, Cambridge, during the four and a half years which followed the operation. The results of the experiment went far to solve the problem of "deep sensibility" which was found to persist after all the cutaneous sensory nerves to a part had been divided. They succeeded in proving that deep sensibility is an important factor in the sum of afferent impulses which pass to the central nervous system, for the impulses conducted by the afferent fibres of the motor nerves underlie our sensations of tactile and painful pressure, of the locality of deep touch, and of the position of any part of the body in space. Here, then, is a notable advance in scientific medicine, achieved by experimental observations of such a refined character that the subject of the experiment required to be a trained physiologist. We must record our admiration of the self-sacrifice of Head in the cause of science, and congratulate the London Hospital Medical School, of which he is so distinguished an ornament, on the completion of this important research.

Finally, I should like to refer to the experimental work of Alexis Carrell, a young Frenchman, who was sent from Paris to look after the medical interests of the French immigrants in Canada. This did not fulfil his aspirations, and he changed his

sphere of action to the United States, and devoted himself to research work in the Rockefeller Institute of New York. The first of his papers to attract world-wide attention was that in which he showed that it was possible to join together the divided ends of arteries or veins, or a vein with an artery. This at once led to the successful practice in the human subject of repairing wounded blood-vessels without obliteration of their lumen, and the removal of travelled clots from the interior of an artery. A wide field has thus been opened for further triumphs in the surgery of the circulation. For example, in threatening gangrene of the leg, due to narrowing of the main artery, the femoral artery and vein may be cut across in the thigh, and transposed, so that a sufficient amount of arterial blood may pass down the healthy vein instead of through the diseased and partially blocked artery.

Not satisfied with stitching an artery to a vein, Carrell proceeded to insert a portion of a transplanted artery or vein between the ends of a divided vessel; he not only succeeded in this, but in transplanting portions of vessels into cats which had been resected from dogs and kept in cold storage for several weeks. His most wonderful experiments were those in which he transplanted whole organs, such as the kidney along with its blood-vessels, from one animal to another, when secretion of urine was observed to begin immediately the arterial circulation was established. These experiments bring just within the range of the possible the transplanting from a man killed by an accident such an indispensable organ as the thyroid or pituitary body into a person in whom such organ has been destroyed by disease.

Gentlemen, I might have cited many other triumphs of experimental research, but those to which I have referred abundantly show that, great as have been the achievements in the past, we can look forward with confidence to still more wonderful advances in the future. It will be your duty, as it is mine, to do our utmost to qualify ourselves so that we may be able to contribute to those, and to carry the scientific spirit into the study and practice of our profession. Give me your help in cultivating this scientific spirit in the teaching and study of Surgery during the session which is before us.

THE MEDICAL MAN AS SOCIAL REFORMER.

By LACHLAN GRANT, M.D.

THERE are few more striking facts in recent history than the rise of the medical man as an all-important factor in the life and progress of the people. There was a time when the whole duties of a disciple of the Æsculapian art were supposed to centre round his consulting-room and the bedside of the patients who might send for him. To cure his clients and to make as good a living as he could in the process were the somewhat narrow limits bounding his professional activity. Questions of public health and the systematic prevention of disease by natural means were quite beyond his scope. It was not that medical men selfishly objected to such beneficent innovations because they might tend to reduce the grist that came to their mill, but rather because the general trend of thought had been hitherto purely individualistic, and, beyond a few prophetic souls crying in the wilderness, there existed no idea of combating social and bodily evils by concerted public action. State control and local government were in the crude, embryonic stage, and it was thought quite wonderful that a medical man should be sent to Parliament. Then, even among some members of the profession, diseases were looked upon in a more or less fatalistic spirit as inevitable, and that every man must look out for himself, accepting consequences either as visitations of Providence or as the blind operations of some malevolent spirit existing in Nature.

But now, at the end of the first decade of the twentieth century, the medical man as an essential factor in the life and progress of the people is swiftly coming to his own. His attitude to the public and the attitude of the public to him have already undergone a complete transformation. Matters that were considered quite foreign to his province are now primarily under his professional jurisdiction.

It is no longer a case of treating individual patients and ending there. Personal health has more attention than ever in the history of medicine; but public health, on which personal health so largely depends, has developed into a complicated problem of universal importance, and is recognised by every civilised country. The medical reformer is thus brought intimately into contact with problems in social science, economics and ethics; and such matters

as housing, drainage, ventilation, water, food, adulteration, education and child-life are constantly under his purview. Even the D.P.H. curriculum does not cover anything like the whole ground, as those who hold it soon discover when brought face to face with the hydra-headed monster of social disease, which in spite of so many efforts continues to eat, like an invincible canker, into the very vitals of every civilised nation.

The most optimistic and experienced of medical practitioners will confess to feelings of baffled impotence when they contemplate the unnatural and inhuman conditions in which millions of our fellow-beings are compelled to exist. Every medical man is aware of the terrible holocaust of child-life which alone is sufficient to stigmatise our boasted civilisation and progress as a disgrace and a sham. And if we medical men were to reveal to the world the whole of our gruesome experience, nobody with any pretence to religion or humanity could resist the conclusion that there was something rotten at the very foundations of society, and that it was the clear and bounden duty of one and all to unite in extirpating these horrors at whatever cost.

All reformers have to face three great obstructive elements —public apathy, private interests, and the passive resistance of those who dislike change, or any interference with the rates.

Medical officers of health could many a tale unfold of selfish opposition to elementary precautions against epidemics, and of barefaced if not active defiance of the law on the part of those looked upon as superior persons and patriotic citizens.

If the general public were alive to their own interests, rights and powers, there would soon be an end of all such anti-social tactics. And here, I think, much more might be done by the profession generally, and the health medical officers particularly, in enlightening the country on the facts and in pressing for more thorough-going legislation to combat the forces that make for disease, deterioration, poverty and crime.

There are no more loyal, conscientious and hard-working public officials than our health officers, and they have frequently to carry on their work under harassing and discouraging conditions. They have done a vast amount of useful work and introduced more enlightened ideas to the lasting benefit of the people. But with all due respect I think some of them might do more; they are too docile and obedient to the powers that be and to the dominant section in many public bodies, whose policy is low rates in preference to public convenience, comfort and efficiency.

In some cases, I admit, plain speaking on the part of the medical officer would be followed by disagreeable consequences, and his position would be endangered. That such results of performing a public duty should be possible anywhere in a free country constitutes a national danger, and should be combated uncompromisingly both by the profession and the public.

It is notorious that some medical officers, by reason of the reactionary influences referred to, exert the minimum of their power and influence, permit certain elements in the law to become a dead letter, and allow some matters to slide that menace the health of the community.

Many private medical practitioners are in the same predicament. If they point to certain evils and agitate for their removal, if they speak or write in public advocating adequate reforms *pro bono publico*, they are marked men and made to suffer. This sort of thing is more apparent in country districts than in the larger towns, where the more democratic spirit keeps in check the property and territorial influences. But even the towns and cities are not exempt from this form of intolerance.

Many medical men have come to see that medical science, sanitation and local government regulations are quite inadequate to deal with the ever-increasing burden of poverty, squalor, starvation and disease resulting in wholesale physical, mental and moral deterioration. They consequently advocate sweeping measures of reform, social and economic, and a more vigorous application of the laws of the land.

For doing so they are sometimes stigmatised as cranks, Socialists or busybodies, and made to feel the weight of the enemy's displeasure by various forms of ostracism and petty persecution.

The bulk of the profession not being in a sheltered position cannot afford to jeopardise their bread and butter. Many are so placed that the plainest living is barely secured by dint of very hard work night and day: their worries are ever present; their leisure is practically *nil*; they have neither time nor energy for the purpose of keeping themselves posted in new methods and discoveries, not to speak of public, social or altruistic work. Hence many remain silent who have the will and the knowledge to speak out and add their voices to those of the militant minority.

Medical officers of health are neither ubiquitous nor all-powerful, and much must escape their attention that they ought to know.

There should be a reorganisation and a co-ordination of all medical and public health activities, dealing with all hospitals, dispensaries, factories, workshops, warehouses, mines, railways, ships, hotels, schools, restaurants and private dwellings. Sanitary and food inspectors perform valuable duties that form part of a national health system, and as such should be incorporated as a department under the medical officers; they might properly be called lay members of the profession, performing special duties which might be well extended.

All hospitals, infirmaries, convalescent homes and nurses' training schools and institutions should be taken over and kept up by the public authorities. In this way every medical man in the country would be enlisted in the national health service, and there never will be real efficiency until this is done.

It would mean the elimination of that bugbear, the commercial element from the activities of the profession, and the abolition of wasteful and undignified competition for a *clientèle* among private practitioners.

This idea pushed to its logical conclusion means nationalisation of the whole medical service. No one can deny that, at present, lack of organisation and unification of the forces fighting disease and deterioration is a retarding and stultifying element in the national life. A medical bureaucracy, working behind the scenes, and controlled by a few diplomats at headquarters, with the county medical officers as pretorian outposts, can never be a satisfactory system of public health in this country.

We have now arrived at a stage in our history when it is clearly incumbent on social reformers of every school to advocate the establishment of a separate, independent governmental department for the administration of public health, with a political chief of the dignity of a Cabinet minister.

As things are at present there is an undeniable tendency for the Government to put too much responsibility on the few medical men at headquarters, and to rely overmuch on the opinions of the medical officers of health.

The public health administration is undermanned from top to bottom, and this is as much in evidence in Whitehall as in the city ward or the country parish.

One great defect is the lack of comprehensiveness, which can only be remedied by a broadening of the basis of the theory of national hygiene, and a great enlargement of the scope of its practical work.

We are past the time when public health was narrowed down to questions of drainage, ventilation, water-supply, infectious diseases and vital statistics. After all, the public health curriculum is suggestive of a somewhat circumscribed and lopsided equipment for dealing with the multifarious phases of public health, physical efficiency, and the prevention of deterioration and disease, which should be all logically embraced in the administrative machinery of a great nation. It is clear that in future the present public health officials must be supplemented both by other specialists and every-day practitioners of medicine.

To begin with, the proposed minister of national health should be an eminent medical man of high scientific attainments and great administrative capacity.

To assist him, a council of paid specialists should be appointed, representative of the various branches of medicine and surgery, such as mental, children's, women's, ear, throat, eye and skin diseases. And to endeavour to take away the standing reproach against us as a civilised and progressive nation that such horrible infantile mortality and ominous deterioration of manhood should exist in the richest country of the world, special committees should be appointed to investigate causes, educate the people in matters of health, diet and physical development, and suggest ways and means of arresting the national dry rot that in time would certainly jeopardise our national existence.

Medical officers of health throughout the country are, generally speaking, largely out of touch with ordinary medical and surgical diseases, and are not necessarily equipped by training or experience to deal in detail with, say, the varied maladies and defects abounding in our public schools. Their efforts would therefore require to be supplemented by additional colleagues from practitioners constantly accustomed to these branches of medicine and surgery.

Just as we require a standing committee of defence against external enemies to be on the alert and consider each and every phase of national security and problematical danger, so does the country require a vigilant, adequate and efficient body of medical experts to tackle the internal enemies of ill-health, inefficiency, inebriety, dirt and disease.

Doubtless the *economists* will object that all this will cost a sum of money; but if they could only see a little further than the mere cash nexus they would also be convinced that the outlay would bring a large return in more efficiency and lessened poverty and disease.

Compared with the law, the army, the navy, the civil service, and the consular and diplomatic bodies, our profession occupies a ridiculously inadequate position in the councils of the nation. If the country does not grudge handsome salaries and pensions to legal luminaries to administer the law and keep us in order, why should it demur to similar generosity towards a corresponding body of medical experts to administer the public health and endeavour to keep us healthy and fit.

Similarly with the defensive forces: large salaries are paid to officers and official experts for the purpose of keeping the arms-bearing section of the citizens in health and efficiency and for guarding against external enemies. Why, then, not organise in as thorough a manner against the more insidious and dangerous enemies of dirt, disease, deformity, deterioration, high death-rate, and diminishing birth-rates?

The humblest member of our profession should be made to feel that he is a consul of health representing the central authority, and that there is, at least, as ample scope for talent, ability, industry and energy in the public medical service as in that of the other professions. To trust to the gallant efforts of a comparatively small body of officials and a few voluntary helpers in such a matter of high national importance is wrong. To place the majority of medical men in circumstances where their incomes fluctuate according to the prevalence of disease is wrong. To have hundreds of unemployed graduates hanging around waiting for a spot or a practice, or crowding into the centres of population and almost taking the bread out of each others' mouths is unworthy and wasteful. To see outlying districts in every part of the kingdom left almost derelict as regards medical attendance, because no practitioner can make a living on the usual commercial lines, is cruel, inefficient and shortsighted.

If the Postmaster-General refused to establish a post office in a rural district or outlying village, because, in itself, it could not pay expenses, it would be justly considered an absurdity. The wonderful Post Office organisation is a national affair, and its business is to see that every town, village, hamlet, clachan, house and village in the British dominions is brought into the circuit of postal communication. Each place is not examined with a financial microscope to see if the officials can make their wages out of the business done locally. The service is considered as a whole, and, financially speaking, the good is taken with the bad.

And so it ought to be with the medical service (with the nursing

and dispensing services as subsidiary branches). The remuneration and other conditions ought to be on a uniform and liberal scale sufficient to attract good men and women to the work. It is an unjust and invidious distinction on the part of the public that we are expected to give free attendance in emergencies and in urgent cases; and if we try sometimes to get paid for such work we are blamed and looked upon as professional harpies.

Fancy a lawyer being frequently compelled to give his services free, and to be considered a greedy monster if he looked for remuneration. Let us have compulsion to attend all and sundry who require medical assistance, but let the country pay us decently for our services. Freed from the anxiety and uncertainty of income, and of the incubus of accounting and fee collecting, doctors would be able to concentrate on their proper work of prevention of disease and keeping the community at a high level of efficiency. They would have ample time to devote to health lectures, physical culture, ambulance and nursing classes, and other educational agencies, besides taking their part in the social life of the community and working for the common good as a physician in the highest sense of the word.

In the meantime, taking things as they are, much may be done by the influence and pressure of medical opinion in helping on many needful reforms for the people's benefit. And until the time arrives when medical men are made independent of narrow, selfish, petty, local or class interests, and have no longer to worry about their income and future prospects (just now, with some of the members it is a case of eking out a bare existence which brings the profession dangerously near the category of sweated labour), each and all can do much to point the way and influence public opinion. The medical inspection of school children presents fresh opportunity for doing good and for showing the need of larger measures in the same direction. And our best efforts will be stultified if adequate remuneration is not meantime given for the work, and if the inspectorships are only to be drawn from a comparatively small section of medical men (the D.P.H.'s). Any medical practitioner should be free to enter for such posts.

Doctors cannot din the fact long or loud enough in the ear of the public that great evils accrue from a cast-iron system of education, and that diseased, half-starved, partially deaf, myopic, or otherwise defective children are frequently not fit to attend school, and that it is a cruel wrong to compel them to do so. School buildings require more attention from a health standpoint.

Notwithstanding all the talk about hygiene and our progress in sanitation, etc., many schoolhouses in town and country are dangerously defective in construction, ventilation, drainage, and light supply. Every school, however small, should have ample cloak room and lavatory accommodation; and the time is coming when none will be without gymnasia, baths, dining-rooms, library, and open-air classrooms.

From the medical point of view there is still much to be done in regard to the construction of private dwellings so as to insure the maximum of ventilation and sunlight and the absence of draughts and bad smells.

It is not only in towns that slums and rotten insanitary houses exist; there are thousands of them everywhere in the country. In some districts a really good house is hardly to be found, and a stranger going into an average dwelling is not long in concluding from the evidence of his senses that he is in a damp, dark, badly ventilated, badly heated, badly drained, badly lighted and badly kept house, from which disease could only be kept away by a miracle, and many of these are overcrowded and insanitary in the highest degree.

In the large towns, slum dwellings are pulled down and spaces cleared at the public expense, by which the owners and adjoining proprietors are principally benefited. Similar rookeries speedily grow up in other quarters, and become almost as bad as the old ones, and so on in a vicious circle.

Housing is of the greatest importance, but it is not the *root* of the slum problem; we have to seek for that in unemployment, casual labour, sweating, child labour, and also, I believe, in the callous, needless and wasteful competition in modern industry. These primary causes are seriously aggravated by drink, poor food, adulteration, contaminated milk, ignorance of mothers, and the general sense of depression and repression that pervades the lives and haunts of the submerged tenth.

Most medical men will agree with Bernard Shaw that "what is wrong with the poor is their poverty." Get this put right, and the social problems that confront us will be reduced to much smaller and simpler proportions.

We all agree that "back to the land" is a pressing need of the times, and one of the essential steps in combating physical degeneration. Naturally all men cannot work on the land, but there are thousands suited for agricultural pursuits who are only too eager to return to country life if reasonable facilities be given;

and thousands more who are compelled to leave the country would gladly remain if encouraged to do so. With plenty of idle men and thousands of idle acres, it should not be an insoluble problem to bring the two together for the people's well-being and national prosperity. Otherwise, if depopulation of country districts continues, and if waste of town life be not fully made up, we are bound to go under as a great nation, while our sturdy emigrants go forth to feed foreign countries and rising colonies.

A large robust country population in the British Isles is absolutely necessary to grow more food and make us more self-supporting, to provide a healthy stock as the nation's backbone for recruiting purposes, and to make good the inevitable wastage ever going on under urban conditions. Co-operation in farming, small holdings, municipalisation of land, increased attention to scientific agriculture are all hopeful signs of the times. Medical men, by their influence and prestige, can do much to support and hasten all such pressing reforms so intimately bound up with the ideal of a healthy, happy, free and contented people. The medical profession, individually and collectively, by press and platform agitation, and by petition, might also do much more to advance the solution of the clamourous problems of social disease. The churches are awakening to their duty in regard to such mundane matters as unemployment, sweating, and land reform. Our profession also needs to wake up and take its rightful place in bringing about the peaceful revolution.

People will give ear to medical men when they won't listen to politicians, theorists, and the clergy; our influence is great, and we are not using it to the full. Questions of housing, sanitation and physical development do not arouse political passion or religious strife, and all classes may be confidently appealed to.

More and more we must concentrate on prevention rather than cure, and this can only be attained by the union and strenuous endeavours of all the forces of progress—physical, intellectual, moral and spiritual.

THE SUCTION TREATMENT OF MAMMARY ABSCESS.

By JAMES M. GRAHAM, F.R.C.S.,
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It is intended in this paper to record the results obtained in a series of cases of acute mammary abscess treated in the Surgical Out-Patient Department of the Royal Infirmary by means of suction hyperæmia as recommended by Bier and Klapp.

It is hardly necessary to mention the features of abscess of the breast which distinguish it from abscesses in other superficial parts of the body. The mammary gland is a complex structure, especially during lactation, when suppuration most often occurs. Suppuration may continue longer and sinuses are apt to persist more frequently after incision and drainage or packing than is the case in simple abscesses of other parts. Recently 3 cases were seen with sinuses discharging for 6 to 18 months after the original incision of the abscess. Such examples are, of course, extreme, but sinuses failing to close for 8 to 10 weeks are not uncommon. There is also a tendency in some cases for the suppuration to recur or for secondary abscesses to form in other parts of the breast during the course of the treatment. Free incision and drainage, whilst successful in overcoming the inflammation and in arresting the suppuration, are not without certain disadvantages which depend on their very thoroughness. There is the future function of the breast to be considered. The sooner the suppuration ceases the less will the breast be damaged, but impairment will also vary with the amount of scar tissue and induration from the incisions and presence of drainage tubes for a longer or shorter time. After a moderate suppuration the loss of function is often complete at future periods of lactation, and the presence of a scar may predispose to further abscess formation. Out of 30 cases of intra-mammary abscess, in 5 both breasts were involved either at the same time or separately—a fact which further emphasises the importance of conservative treatment.

The use of the suction cup is intended to avoid certain of these disadvantages. It is claimed that the breast can be readily emptied of milk with relief of tension, that short incisions are sufficient, and that drainage tubes can be soon discarded. Finally, in favour of the suction method, it is stated that healing is rapid,

PLATE No. 1.—The application of the large breast cup for intra-mammary abscess.

PLATE No. 2.—Shows the size of incisions used in a large abscess, induration not being marked. Case 29. Healed in 10 days.

that the cosmetic results are better, and the function of the breast less likely to be disturbed than if free incision and drainage alone are used.

The details of treatment have been carefully followed in the series of cases, but modifications have been found necessary from time to time according to the circumstances. Before discussing the technique and the results, the general features of the cases will be mentioned.

General Features.—Thirty-two cases of intra-mammary abscess occurring in 30 patients were treated by cupping. With the exception of 2 cases the breast was actively functioning at the onset of inflammation. In 17 cases the abscess began within 3 weeks of the confinement, in 8 cases at other periods of the puerperium, and in 5 cases the symptoms commenced after weaning. Infection from the nipple was the obvious cause, except in 2 instances where there was a pustular rash on the skin.

The pus was examined from 28 abscesses. The different varieties of staphylococci were found alone and in combination. In one case the streptococcus pyogenes was the only organism present. The results of culture were as follows:—

Staphylococcus aureus . . .	= 11
„ albus . . .	= 5
„ aureus and albus . .	= 3
„ albus and citreus . .	= 3
„ Citreus . . .	= 3
„ Citreus and flavus .	= 2
Streptococcus pyogenes . . .	= 1

To a certain extent the type of abscess varied with the organism present, the severer inflammations being due to the staphylococcus aureus. In the latter cases the pus was thicker, the tissues of the breast infiltrated around the abscess, and freer incisions were necessary.

Technique of Treatment.—It is important to note that Bier obtained only indifferent results in the treatment of acute abscesses by suction till the technique which he now recommends was adopted by Klapp. The cup is applied 3 to 6 times for 5 minutes, with a few minutes' interval between each application. This is repeated daily, and is continued for a few days after the suppuration has ceased. It is necessary that the cup should fit the breast exactly, and when many cases have to be treated a series of cups of different size must be at hand. A moderate

degree of suction is all that is required, and will produce swelling and congestion of the breast without any pain. If the cup is applied immediately after incision very little suction is needed to evacuate the pus; after a few minutes the abscess cavity is clean and a considerable amount of venous blood is extracted. On the following days the removal of pus is followed by a flow of serum into the cup. If there is a tendency to bleed after incision, it is necessary to pack the cavity for 24 hours and thereafter to treat by suction. Milk is most readily removed by a small cup such as the ordinary breast-pump applied over the nipple, although a considerable amount comes away in addition with the large breast-cup.

Incisions.—A general anæsthetic was given in every case: 3 to 4 c.c. of ethyl chloride in a Clover's inhaler gave a sufficiently long anæsthesia, except for severe cases, when chloroform was used. A series of cases was treated in exactly the manner described by Bier, short incisions of ½ to 1 c.m. being made without the introduction of the finger. Where the abscess was circumscribed and fairly quiescent there was early healing, with an almost invisible scar and no induration; but when the abscess was large, affecting more than one quadrant, there was a tendency for secondary abscesses to form, which had to be incised later. In the majority of the cases the incisions were made ¾ to 1 inch or more in length sufficiently large to allow the finger to explore the recesses of the cavity. One or more incisions were made according to circumstances, and if the whole breast was involved, all four quadrants were incised. Small glass drainage tubes were inserted for a few days till the suppuration was reduced in amount. The incisions were, as a rule, radial, to avoid injuring the ducts, but when the suppuration extended to the periphery of the gland the incision was made coronal, with distinct advantage. This applies chiefly to the lower quadrant where the radial incision has frequently a tendency to gape and to delay cicatrisation. The coronal incision, on the other hand, gives a fine linear scar, the lips of the wound coming accurately together when the tube is removed and the scar is concealed by the dependent breast.

The Results of Treatment.—For simple premammary abscesses a small puncture incision was made and a cup of suitable size applied to the affected part of the breast. The treatment was satisfactory in every respect, suppuration being arrested quickly and healing complete in a few days. Seven cases of premammary abscess, including one case of mastitis neonatorum, were treated.

Name.	Age.	Cause.	Pus Stopped.	Healed.
Mrs. C.	26	Pregnant 8th month	1 day	6 days
Mrs. P.	63	Skin infection	1 day	4 days
Mrs. F.	23	Pregnant 7th month	1 day	6 days
Mrs. J.	41	Pedicular rash	1 day	7 days
Mrs. McC.	40	Pustules on skin	3 days	10 days
Mrs. H.	23	Puerperal	2 days	6 days
Baby A.	3 weeks	Mastitis neonatorum	1 day	4 days

In the intra-mammary cases suction proved of special value in quickly clearing up the pus, and it was found that drainage tubes in many cases could be soon dispensed with. On the whole, somewhat smaller incisions than usual can be used, but the experience was sufficient to show that the size of the incisions must be varied to suit the necessities of each case. A routine treatment by small incisions and cupping will not give uniformly good results. The series of cases Nos. 9 to 19 treated by small incisions, without introducing the finger as is recommended by Bier, illustrate this point. In 5 of the 11 cases a second incision was required within a few days for recurrence of the suppuration, due most probably to foci of infection which had not been properly drained. Apart from this complication the after-result was good, healing was rapid, and the scars were almost invisible. With larger incisions sufficient to allow the finger to explore the recesses of the cavity and to make counter openings if necessary, the results were satisfactory. In a certain type of case, however, it was obvious that free incisions only should be employed. When the abscess is diffuse, the pus thick, and the tissues brawny with inflammation, it is advisable to incise freely. Unless this is done, the inflammation will not readily subside, further incisions may be necessary, and the course of the case is tedious. Cases 2 and 3 were of this nature, and two cases of similar type at present under treatment emphasise the importance of large incisions when inflammatory induration is a prominent feature. In abscesses of moderate size, and in large abscesses where the surrounding infiltration is not marked, incisions of 1 inch in extent, large enough to admit the finger, were found ample to relieve tension and to give free exit to the pus in conjunction with suction. In the 32 cases of intra-mammary abscess healing was complete within the following periods:—

11	cases	healed	within	2	weeks.
12	,,	,,	,,	3	,,
4	,,	,,	,,	4	,,
3	,,	,,	,,	5	,,
1	case	,,	,,	8	,,
1	,,	,,	,,	9	,,

A comparison between the suction treatment and simple incision with packing of iodoform gauze was made in two patients (Cases 22 and 23) suffering from double mastitis. In each case the larger abscess was treated by suction, and relatively shorter incisions. With both methods the discharge was soon arrested, and healing was complete about the same time—a result which reflected favourably on the use of suction as the abscesses so treated were much the larger.

Suction is particularly useful in supplementing drainage, and the impression was that in many of the cases healing was accelerated by the quickness with which the suppuration was removed. In this connection a reference may be made to the beneficial effect of cupping in cases of chronic sinuses which refuse to heal with simple drainage. Seven of these cases were treated, and in all the improvement was rapid and marked, the discharges quickly dried up, tubes could soon be left out, and healing was hastened.

In conclusion, I should like to express my thanks to the Assistant-Surgeons successively in charge of the Out-Patient Department of the Royal Infirmary for permission to make use of the material on which this paper is based.

Notes of the Intra-mammary Cases.

Case 1.—M. W., æt. 21. Staphyl. aur. Symptoms began 3 weeks after confinement; duration, 6 days. Deep abscess in upper quadrant. Breast uniformly tense and indurated. Incised on 12th May 1908. Suppuration practically nil after 5 days. Healed in 3 weeks.

Case 2.—Mrs. B., æt. 22. Staphyl. aur. Pain began 2 weeks after confinement; duration of symptoms, 6 weeks. Great swelling of right breast. Incised in lower, inner and outer quadrants on 20th May 1908. Suppuration very slight after 10 days, but induration and swelling remained very marked. Sinuses not completely closed for 9 weeks.

Case 3.—Mrs. R., æt. 21. Staphyl. aur. Symptoms began 2 weeks after confinement; 4 weeks' duration. Large diffuse abscess of right breast. Incised in four quadrants on 9th June 1908. Pus very thick and induration marked. 22nd June, had to be freely incised because of pain and continuance of inflammation. Healed in 8 weeks.

Case 4.—Mrs. D., æt. 25. Staphyl. alb. Symptoms began 3 days after weaning; 14 days' duration. Abscess in lower quadrant

of left breast. Three-quarters inch incision on 10th July 1908. Suppuration ceased in 2 days. Healed in 10 days.

Case 5.—Mrs. C., æt. 21. Staphyl. alb. Symptoms began at weaning, 9 months after confinement; 1 week's duration. Abscess in inner part of left breast, which was very tense with milk. Incised 3rd August 1908. Pus stopped in 4 days. Healed in 14 days.

Case 6.—Mrs. M., æt. 19. Staphyl. citr. Symptoms began 7 weeks after confinement; 3 weeks' duration. Whole breast red and inflamed. Skin above nipple necrotic. Incised and skin clipped away on 22nd September 1908. Suppuration stopped in 1 day. Healed in 21 days.

Case 7.—Mrs. P., æt. 28. Symptoms began 6 months after confinement; 10 days' duration. Short incision in inner quadrant on 15th August 1908. 9 ozs. of pus. Suppuration nil after 6 days. Healed in 18 days.

Case 8.—Mrs. A., æt. 39. Staphyl. aur. Symptoms began 4½ months after confinement; duration, 3 weeks. Sinus present below nipple. Large abscess in lower and inner quadrants. Incised 26th August 1908. Suppuration stopped after 10 days. Healed in 5 weeks.

Case 9.—Mrs. H., æt. 29. Both breasts affected. Symptoms began 1 week after confinement: duration, 3 weeks. Right breast—small abscess in lower quadrant, puncture incision on 1st November 1908. Pus stopped in 2 days; healed in 8 days. Left breast—larger abscess in inner quadrant, puncture incision. Suppuration recurred in a few days and a freer incision was made, healing complete in 14 days.

Case 10.—Mrs. M'C., æt. 34. Staphyl. citr. Symptoms began after weaning; duration 3 weeks. Abscess in lower quadrant, discharging through a small sinus. Separate abscess in upper quadrant incised by small incision on 22nd October 1908. Ten days later a new focus incised in outer quadrant. Healing complete in 18 days.

Case 11.—Mrs. M'B., æt. 27. Symptoms began 2 weeks after confinement; duration, 10 days. Large abscess on left breast. Small incisions in upper, inner and lower quadrants on 3rd November 1908. Pus stopped in 4 days. Healed in 14 days.

Case 12.—Mrs. J., æt. 42. Infection due to pedicular rash; duration of symptoms, 3 weeks. Abscess size of large plum in lower quadrant. Puncture incision on 13th November 1908. Healed in 7 days.

Case 13.—Mrs. C., æt. 26. Staphyl. aur. and alb. Symptoms began 5 weeks after confinement; 2 weeks' duration. Large abscess in upper and inner quadrant. Opened on 17th November 1908 in two places. Puncture incisions. On fifth day incised again for second focus. Healed in 15 days.

Case 14.—Mrs. H., æt. 24. Staphyl. aur. and alb. Symptoms began 11 months after confinement, while still nursing; 2 weeks' duration. Abscess size of tennis ball in upper, inner and lower quadrants, induration round, not marked. Three short incisions made on 2nd December 1908. Healed in 9 days.

Case 15.—Mrs. W., æt. 26. Staphyl. aur. Symptoms began 2½ months after confinement; duration, 14 days. Abscess in inner quadrant. Puncture incision on 3rd December 1908. Pus ceased in 2 days. Healed in 13 days.

Case 16.—Mrs. A., æt. 25. Staphyl. aur. Symptoms began 1 week after confinement; 3 weeks' duration. Large abscess in inner, upper and lower quadrants. Three short incisions on 8th December 1908. Practically no pus after 2 days. Healing complete in 21 days.

Case 17.—Mrs. H., æt. 25. Staphyl. aur. and alb. Symptoms began 3 days after confinement; 2½ weeks' duration. Incised in lower, inner and outer quadrants on 21st December 1908. Great induration present even after incision; 6 days later a further incision was necessary. Thereafter induration quickly subsided and pus ceased. Healed in 4 weeks.

Case 18.—D. A., æt. 56. Staphyl. aur. Small abscess in upper quadrant from skin infection. Incised on 22nd December 1908. Healed in 8 days.

Case 19.—Mrs. F., æt. 18. Staphyl. alb. Symptoms began 3 weeks after confinement; duration, 1 week. Large abscess of right breast in outer quadrant. Short incision on 28th January 1908. Pus stopped in 4 days. Healed in 14 days. A few days later a fresh focus incised in upper quadrant. Healed in 27 days from first incision.

Case 20.—Mrs. M'F., æt. 37. Streptococcus pyogenes. Symptoms began 1 week after weaning; duration, 2 weeks. Deep abscess in inner and lower quadrants of right breast. Two incisions on 12th February 1909. Suppuration ceased after 3 days. Healed in 17 days.

Case 21.—Mrs. M., æt. 33. Staphyl. alb. Symptoms began 5 weeks after confinement; 6 days' duration. Abscess in upper quadrant. Incised on 14th February 1909. Pus stopped after 4 days. Healed in 15 days.

Case 22.—Mrs. M'M., æt. 34. Staphyl. citr. and flav. Both breasts affected. Left breast much the worse. Duration of symptoms, 3 weeks in left breast and 5 days in right breast. Both nipples ulcerated and covered with scabs. Inner, upper and lower quadrants affected in left breast. Three short incisions, and cupped on 24th February 1909. The right breast showed a small abscess in upper quadrant. Freely incised and packed with iodoform gauze. No cupping applied to the right breast during the treatment, whilst the left breast was cupped daily. After 3 days suppuration and inflammation were practically gone from both breasts. A week later a small second abscess was opened in the right breast. Healing was complete in both breasts in 4½ weeks.

Case 23.—Mrs. M'L., æt. 33. Staphyl. aur. Both breasts affected. Left breast much the worse; duration of symptoms, 3 weeks in left breast, 10 days in right. Upper, inner and outer quadrants affected in left breast. Three short incisions and cupped on 9th March 1909. Right breast showed a small abscess in upper quadrant. Incised freely and packed with iodoform gauze without cupping. Four days later a second abscess opened in right breast in lower quadrant. Healing complete in left breast in 4½ weeks, in right breast in 4 weeks.

Case 24.—Mrs. M., æt. 19. Staphyl. aur. Symptoms began 3 weeks after confinement; duration, 1 week. Severe mastitis of right breast. Short incisions in outer, inner and lower quadrants. Suppuration ceased in 10 days. Healed in 3 weeks.

Case 25.—Mary D., æt. 24. Staphyl. aur. Symptoms began 10 days after confinement; 14 days' duration. Large abscess involving the inner half of right breast. Incised in 3 places on 16th April 1909. Pus arrested in 10 days. Healed in 3½ weeks.

Case 26.—Mrs. F., æt. 18. Staphyl. citr. and alb. The same patient as case No. 19. Symptoms began 3½ months after confinement; duration, 3 weeks. Large abscess in upper and inner quadrants of left breast. Three short incisions on 21st April 1909. Slight discharge of pus for 10 days. Healed in 3 weeks.

Case 27.—Mrs. D., æt. 25. Staphyl. aur. Symptoms began after weaning; duration, 1 week. Abscess affected inner quadrant of right breast. Incised on 10th May 1909. Pus stopped in 5 days. Healed in 20 days.

Case 28.—Mrs. R., æt. 43. Staphyl. citr. Symptoms began 3 weeks after confinement; duration, 1 week. Nipple very painful, abscess in inner and lower quadrant of left breast.

Incised on 29th June 1909. Pus stopped in 3 days. Healed in 13 days.

Case 29.—Mrs. W., æt. 27.—Staphyl. alb. Symptoms began 2 weeks after confinement; duration, 10 days. Left breast greatly swollen. Abscess diffuse, invading the 4 quadrants. Four short incisions on 1st July 1909. Suppuration stopped after 4 days. Healed in 10 days.

Case 30.—Mrs. C., æt. 21. Staphyl. alb. and citr. Both breasts affected; duration of symptoms, 4 weeks. Right breast greatly enlarged and discharging above and below nipple. Large abscess involving practically the whole breast. Incised 23rd July 1909. Packed for 24 hours because of bleeding, thereafter cupped daily. Pus arrested in 6 days. Healed in 3½ weeks. In the left breast the abscess involved the lower and inner quadrants. Incised in 3 places. Suppuration ceased in 4 days. Healed in 3 weeks.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH, ROYAL COLLEGE OF SURGEONS OF EDINBURGH, AND FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.

The following candidates, having passed the requisite examinations of the above Board in October, were admitted Diplomates in Public Health:—Alfred Beswick Darling, Scotland; Richard Lee Bolton, Lennoxtown; Cecil Charles Murison, India; Jamesina Jean Marr, Scotland; Francis Wood Greaves, Barbados; James Blakely Miller, Scotland; Douglas Panton Blair, Scotland; Richard Baring Davidson, Congleton; and John Allan, Partick.

At the same sederunt, the following candidates passed the First Examination in Public Health:—Louis William Crombie Macpherson, Scotland; Laurence Gibson, Scotland; William Hector Mackenzie, Scotland; Agnes Ellen Porter, Colombo; John Reid, Glasgow; Byramji Shavaksha Tarapurvalla, Bombay; and John Scott, Scotland.

OBITUARY.

SIR ARTHUR MITCHELL, K.C.B., M.A., M.D., LL.D.

THE most many-sided man in Scotland died at the good old age of eighty-three in Edinburgh on 12th October 1909.

Arthur Mitchell was born in Elgin in 1826. He came of a professional stock. He was educated in the Aberdeen University, where he took the degrees of M.A. and M.D. After studying in Paris, Berlin, and Vienna, he engaged in practice in Glasgow for a short time, where his health threatened to break down from lung disease. He then travelled in Egypt, where he made the acquaintance of various persons of influence who were of service to him in his future life. On his return to this country he received the appointment which determined the chief work of his life, in the shape of one of the Deputy Commissionerships in Lunacy, as provided for by the new Act for the Treatment of the Insane, of 1857. He threw himself enthusiastically into that work, which consisted in the supervision of the idiots, imbeciles, and chronic harmless insane who were boarded with their relatives or others throughout the whole extent of Scotland and its islands. It seemed an uninteresting and monotonous employment for an able and original-minded doctor, but Mitchell soon showed it to be a work of unusual importance. He found the unfortunate subjects of his inspection, to a large extent, neglected and unsupervised. He saw being built in Scotland new hospitals for the insane, and great enthusiasm arising for the hospital treatment and study of mental disease. The idea, then, was that every mentally afflicted person should, as a matter of course, be sent to those asylums when they were ready to receive them. He had the penetration and originality to see that there was scope for another mode of treatment which would be far more suitable and far cheaper for a certain class of the mentally defective. He set himself to devise a system of right treatment and care, to arrange for regular official inspection by the local doctor, the inspector of poor, and the Deputy Commissioner in Lunacy. He first had to convince his own Board, of which he was not a member, that this system was a good one for the country, as well as for the patient, and that it should be encouraged. His Board backed him up thoroughly, largely through the efforts of Sir James Coxe and Dr. Browne, the Medical Commissioners. He had to convince the public authorities too, and create a public opinion in favour of his system. All this he did by patience, enthusiasm, and his unusual powers of persuasion. In 1864 he wrote his classical work on *The Insane in Private Dwellings*, which, with the practical success of the system he advocated, helped

to make Scottish Lunacy Administration the envy and the admiration of the world. In 1870, on the resignation of Dr. W. A. F. Browne, he was promoted to be a Commissioner in Lunacy. In that capacity he helped to advance, extend, and consolidate the whole work of Lunacy Administration in Scotland. He gradually acquired the confidence of the District Boards of Lunacy, of the medical profession, and, above all, of the physicians to mental hospitals who were ever ready to seek his advice, and for the most part to follow it. He showed himself to be a man of an admirable judgment, of enthusiasm in his work, ready to receive and consider new ideas, and of an innate sympathy for the most afflicted class of humanity.

Dr. Mitchell did much for the purely medical and scientific side of mental disease and defect. He wrote valuable papers on "The Effects of Consanguineous Marriages," "The Statistics of Insanity," "The Diseases of Early Life," "The Effects of Difficult Labour and Plural Births on the Production of Idiocy," "Dreaming, Laughing, and Blushing," and he was the Morison Lecturer on Insanity to the Royal College of Physicians of Edinburgh for the years 1867-71. In his travels through Scotland—and he used to say that he had been in every parish in the country—he brought into use perhaps his most striking mental quality of observing and noting everything that he saw. He not only had antiquarian tastes, but a true scientific instinct of the relation of antiquarian facts to human history and progress. When the Rhind Lectureship was established in connection with the Scottish Society of Antiquarians, of which he was Secretary, Dr. Mitchell was appointed the first lecturer. He then showed that he was an archeologist of the first order. He marshalled and arranged his observations and the results of his reading, he passed them all through the crucible of his own mind and drew conclusions from them that were of real service to the history of civilisation. When he wrote his work, *The Past in the Present: What is Civilisation?* it placed him in the first rank of those in this country who have studied the history of the race. His literary style was an easy and popular one, so that vast numbers of people read his work. It secured him popular fame. He has steadily worked in that department ever since, and in connection with it he naturally took up the work of the "Scottish Text Society" and the "Scottish History Society," being on the Councils of both. His last antiquarian work was an exhaustive *List of Travels and Tours in Scotland.*

Sir Arthur did admirable work too in meteorology and its relation to disease, publishing valuable observations on the subject, alone and in conjunction with the late Dr. Alexander Buchan. As late as 1908 he read a paper before a large meeting of doctors and scientists on the subject of "The Seasonal Incidence of Scarlet Fever." This by a man of eighty-two was a remarkable example of his zeal for science.

He received many honours and distinctions. He was made a K.C.B. in 1887; he was placed by the Government on the Scottish Universities Commission, and on the English Criminal Lunacy Commission. He was the Chairman of a Commission to inquire into the Lunacy Administration of Ireland.

Sir Arthur Mitchell was one of the best examples in the present generation of a man who made the very most of his innate capacities and of his opportunities. He had an instinctive knowledge of human nature in a high degree, and had the faculty of systematic observation markedly developed. He was indefatigably industrious; his mind was many-sided; his sympathies were wide; he had personal tact and suavity, and he had in all his work the spirit, not of the amateur, but of the professional. His personality was charming in the highest degree. He had troops of friends among men of all classes and professions, and at his death he was universally mourned.

T. S. C.

Dr. HARRY DOUGLAS HAY,

LESLIE, FIFE.

Died September 1909.

Everyone who knew Dr. Hay's work respected him and valued his work, but those who knew Harry Hay could not but love him. He was a man of remarkable character and conduct. After a quiet and quite uneventful undergraduate career, he went to Kennoway, where he practised with success in a small way for some three years. When, thirty-six years ago, the writer of these lines asked Dr. Ferguson of Leslie to go to England to take up a valuable partnership or senior assistantship in a very large practice, he advised Hay to succeed Ferguson in Leslie. For all this time Dr. Hay conducted a large practice in a very characteristic manner. A large, quiet, dignified man, slow of speech, and absolutely ignorant of any devices, he gradually let the public see what a great physician they had among them. In time he secured all the best work of the district, and was beloved and trusted by all the great houses. With all this he never neglected anyone. He was adored by the poorest, though he said little to them, and never asked them for fees.

A very curious thing was that, with all his silence and apparent dulness, his fellow-citizens first made him a town councillor, and then provost, and provost he was till the end. He did an immense deal of hard work; rarely, if ever, took a holiday. A bad accident two years ago gave him a shake, but it was only a fortnight before his death that he confessed to being ill. He made his simple will, took to his bed, and died as quietly as he had lived in his house of Bingartree, which he

had acquired after the death of the last of a family of old patients and friends.

The romance of his life came thirty-three years ago. He married a very lovely young wife. She died, and so did her only baby—and since that day Harry Hay has been waiting.

He was a son of Sir John Hay of Park, of whose large family of sons only one remains. The present baronet is his nephew, and was with him at the end. His townspeople gave him a great funeral. His practice and house go to another, but he will not easily be forgotten by his old friends.

J. B.

RECENT LITERATURE.

CRITICAL SUMMARIES AND ABSTRACTS.

MEDICINE.

By J. SOUTTAR M'KENDRICK, M.D., F.F.P.S.G., F.R.S.E.,
Assistant-Physician to the Western Infirmary, Glasgow.

Sensory Disturbances in Visceral Disease.

(*Continued from* page 390.)

Stomach Pain.—The stomach is supplied by the two vagi, by various plexuses, and has its sensory fibres from the 6th, 7th, 8th and 9th dorsal areas. Head believes that in gastric ulcer "the higher the area of pain and tenderness, the sooner after food will the pain arise," and consequently he believes that the cardiac end of the stomach stands in relation to the 6th and 7th, and the pyloric end to the 8th and 9th, dorsal areas. Mackenzie does not agree with this, however, and in 1892 published statistics showing that out of 320 cases 95 per cent. had the pain referred to the epigastrium. From there it passed in all directions, especially along Head's areas for stomach; with this there was hyperalgesia of the muscles, and increased reflexes. He noted also in gastric ulcer that "although the actual site of the ulcer had no direct relation to the place where the pain was felt, there was a fairly definite relation explicable by the nervous connection of the parts." For example, when the ulcer was at the cardiac end of the stomach, the site of pain was at the ensiform cartilage; when the ulcer was in the middle of the stomach, the pain was at the mid-epigastrium; and when the ulcer was at the pylorus, the pain was at the lowest portion of the epigastrium. This he proved on many occasions, both in the post-mortem room and in the operating-theatre. In ulcer of the stomach there was usually tenderness of the 4th to the 8th dorsal spines.

Intestinal Pain.—From the duodenum to the sigmoid flexure Head believes that the sensory nerve distribution stands in relation to the 10th, 11th and 12th dorsal segments. The duodenum is supplied by the hepatic and superior mesenteric plexuses; the jejunum and ileum by the superior mesenteric plexus; the large intestine by the superior and inferior mesenteric plexuses; the appendix by the superior mesenteric plexus, with its sensory nerves in relation to the 9th, 10th, 11th and 12th dorsal segments (Head); the rectum by the inferior mesenteric and hæmorrhoidal plexuses, with sensory distribution referred to 2nd, 3rd and 4th sacral segments.

Mackenzie has shown that the pain is usually referred to the middle line; the pain of the small intestine limited to the umbilical

region; the pain of the large intestine referred to the hypogastric area, with tenderness over the sacrum: the pain of appendicitis is often limited to the umbilical area, although its radiation and persistence may be one-sided.

Liver and Gall-Bladder Pain.—The liver and gall-bladder are supplied by branches from the hepatic plexus and both pneumogastrics, along with the right phrenic nerve. According to Head, the liver is associated with the 7th to the 10th dorsal segments, more particularly the 8th, 9th and 10th. The gall-bladder is associated chiefly with the 8th and 9th dorsal segments.

Pain is referred to the lower part of the epigastrium and umbilical regions, also along the course of the 7th to 10th intercostal nerves. There is hyperalgesia of the intercostal and erector spinæ muscles, with tenderness over the 8th to the 12th dorsal spines.

Mackenzie has noted in 25 cases of gall-stones that pain usually commences over the upper right rectus muscle, which is firmly contracted, and from there passes across the middle line, with hyperæsthesia extending over the whole right side of chest, and sometimes down to the iliac crest. Pain in liver diseases and likewise in gall-stone colic is frequently referred to the right shoulder and outside of right arm, owing to the nervous communication between the phrenic nerve and the 4th and 5th cervical roots, from which it arises.

In severe attacks of biliary colic both Head and Mackenzie have observed that the pain may be referred to the left side as well as to the right.

Kidney and Ureter Pain.—The kidney and ureter are supplied by the renal plexuses and smallest splanchnic nerve. The referred pain is associated with the 10th, 11th and 12th dorsal segments (Head). "All conditions which lead to interference with the free outflow from the pelvis of the kidney are liable to be associated with this type of pain" (Head).

Mackenzie has made some interesting observations on referred pain in renal colic. In 1892 he published the results of the examination of 17 cases, and he found that the pain usually started in the lumbar region, and passed from there downwards and forwards to the scrotum and penis. "It is interesting to note," he says, "that a portion of the fibres of the cremaster are continuous with the internal oblique, and both of the muscles contract in renal colic. The genital branch of the genito-crural nerve contains the motor nerve to the cremaster muscle, and also the sensory nerve to the tunica vaginalis, which latter becomes so hyperæsthetic in renal colic when the pain shoots into the testicle, and it is manifest that it is to the peripheral distribution of this nerve that the pain is referred." The skin of the scrotum is not affected, for it is supplied by the sacral nerves.

Lung and Pleural Pain.—Although Mackenzie believes that "no

form of stimulation of the lung tissue seems to be capable of producing sensation directly or reflexly," Head does not go so far, for he thinks that acute bronchitis, whether simply inflammatory or tubercular, may produce reflected pain. He thinks also that the areas affected by tenderness are the 3rd and 4th cervical, and the 3rd to the 9th dorsal.

Mackenzie, on the other hand, is of opinion that if there is referred pain, it is from affection of the pleura, and caused by hyperalgesia of the intercostal muscles.

All the other abdominal viscera have been in turn taken up by Head and Mackenzie, and various forms of hyperæsthesia of the skin have been mapped out accordingly.

More recently several interesting papers have been published on the surgical aspects of areas of hyperæsthesia. Maylard has published a book on *Abdominal Pain* from this aspect, and after giving a full account of the anatomical arrangement of the nerves in the abdominal wall, and the relationship of these with the semi-lunar ganglia and various abdominal plexuses, describes fully the meaning of local and referred pain, illustrating by many cases the importance of recognising the true meaning of pain in abdominal disease.

Robinson has written a paper on the "Clinical Bearing of Cutaneous Tenderness in Various Acute Abdominal Disorders, especially in Appendicitis." This paper is practically a critical review of the results previously published by Sherren. Robinson found (in 123 cases) hyperalgesia in 21 per cent. of the cases, while Sherren (in 124 cases) found it in 32·3 per cent. He supports Sherren's hypothesis that the "disappearance of cutaneous tenderness, without improvement in the general condition of the patient, is a sign of perforation or gangrene, and should be the signal for immediate operation." He believes also that "the great majority of patients in whom areas of the nature described are found, do turn out to be suffering from undoubted appendicitis," and also he thinks that "cases of widespread peritonitis set up by appendicitis may display large areas of cutaneous tenderness over the right side or over the whole of the abdomen."

Elsberg and Neuhof found, in acute affections of the gall-bladder, areas of hyperæsthesia more often present than in any other acute abdominal affection. They found them also frequently present in acute affections of the appendix and uterine adnexa. They observed that the presence of hyperalgesia was no index of the gravity of the lesion, but that a sudden disappearance of it was of grave significance.

A somewhat disappointing book is that on *Pain* by Schmidt, for in it scarcely any reference is made to reflex pain and hyperæsthesia. The translators, however, have added a chapter embodying Head's researches on referred pain, and a series of diagrams showing some

of the commoner areas of pain and tenderness in visceral disease, is given.

Let me now mention briefly the views that have been expressed on the much debated question—Is pain ever local, or is it always referred?

Head draws a sharp line of distinction between local and referred pain. He tabulates the distinction as follows :—

Referred.	Local.
(1) The pain is not confined to the area over the affected organ, but tends to form bands round the body, following the lines of spinal segmentation.	The pain is confined strictly to the area of the organ affected, and does not pass round the body in bands.
(2) The pain is mostly associated with cutaneous tenderness, which frequently passes round the body as a horizontal band, and may be quite as marked at a distance from the affected organ as in its neighbourhood.	There is no marked superficial tenderness, but there is deep tenderness.
(3) Pressure usually relieves superficial tenderness.	Pressure increases deep tenderness.
(4) Superficial reflexes are exaggerated over tender areas.	The reflexes are unaltered over areas of deep tenderness.
(5) In disease of the thoracic and abdominal viscera, the referred pain is often accompanied by headache, and superficial tenderness of the scalp.	No association of scalp tenderness with any headache that may be present.

Head believes that pain is often local, more especially in pericarditis, pleurisy and peritonitis. In speaking of pericarditis he says : "Like inflammation of the pleura and peritoneum, inflammation of the pericardium produces a true local pain, with more or less marked deep tenderness." He believes the area of deep tenderness corresponds often to the area over which friction is audible. In pleurisy with friction, he says, there is a local pain as well, increased by pressure of the stethoscope, and similarly in peritonitis. In cardiac disease, also, he thinks the pain may be local. "Probably," he says, "local pain is a distinct feature of the majority of painful cardiac states, but it is usually so masked by referred pain that its presence is very difficult to determine." In paroxysmal cardiac pain, he believes that there is first suddenly a local epigastric pain, and then extremely widespread referred pain. Ross also held similar views, and Maylard strongly believes that local pain may be present in abdominal diseases.

A few sentences from his book on *Abdominal Pain* may be here quoted: "Most clinicians, I imagine, will be inclined to agree that internal viscera and certain other structures within the abdomen do give rise to the sense of pain felt actually in the organ, or structure itself:" "It must not be ignored that under certain stimuli any part of the serous lining may prove a source of acute pain. It is only in this way that it is possible to explain the excessively sharp pain felt on the rupture or perforation of any viscus or adventitious sac:" "The pain in acute peritonitis is not strictly a referred pain." Several other authors write in the same strain, but Mackenzie believes that pain is never local but always referred. He believes that the visceral or sympathetic nerves going to the internal viscera are incapable of conducting sensory impressions, whereas the cerebro-spinal nerves are capable, and refer the pain to their peripheral distribution. It is well known that the viscera normally are painless to the touch. Indeed, as Mackenzie puts it, "the visceral tissues can be cut, torn, and burnt, and the individual remain unconscious of any sensation;" or, in the words of Foster, "a muscle or tendon, the intestine, the liver, or the heart, may be handled, pricked, cut or compressed without any pain or indeed any sensation at all being felt, or any sign of consciousness given. Nevertheless, when the parts are in an abnormal condition even slight stimulation may produce a very marked effect on consciousness." In 1903 Barker translated Lennander's work on *Observations on the Sensibility of the Abdominal Cavity.* In 1900 he (Lennander) made observations on the sensibility of the abdominal cavity during operations on abdominal organs, and herniæ under local anæsthesia alone, or combined with general anæsthesia. He noticed that the parietal peritoneum was extremely sensitive to all operative manipulation, but that the intestinal tract, the mesenteries, the stomach, the anterior border of the liver and the gall-bladder, the great omentum, the serous covering of the bladder, as well as the parenchyma of the kidneys, were wholly insensitive to operation, even with the thermo-cautery. He observed also that these organs were insensible to pain and touch, and also to contact with warm or cold metals, or ice. He proved what Mackenzie had all along held, that the viscera themselves were painless; that even the serous layer of peritoneum was painless, but that the parietal layer of peritoneum when stimulated or stretched produced exquisite pain. Mackenzie's view, that this external layer of the parietal peritoneum was the sensitive area, has likewise been proved experimentally by Ramström. In a most elaborate treatise on the histological structure of the abdominal wall, he has shown that this layer of loose connective tissue lying immediately outside the peritoneum is richly endowed with nerves and nerve endings. These nerves and nerve endings are the terminal branches of the nerves of the abdominal wall—they are

cerebro-spinal, and hence give rise to pain when irritated. The serous layer of peritoneum, however, is supplied by sympathetic nerves, and hence this layer is insensitive to ordinary stimuli.

Mackenzie holds that the serous layer of peritoneum is painless, and in cases of peritonitis, where pain is so severe, as after a ruptured gastric ulcer, or acute inflammation of the gall-bladder or other part, he believes that the pain is due either to marked hyperæsthesia of the skin and muscular hyperalgesia of spinal origin, or conceivably that the inflamed peritoneum with subsequent adhesions affects the sensitive layer external to the parietal peritoneum, either directly or indirectly. Similarly with other serous membranes, Mackenzie believes only on the referred character of pain. Pleurisy and pericarditis cause sensory and motor reflex pain, without any local pain in the serous membranes themselves. "The tunica vaginalis," he says, "is the only sensitive serous membrane covering an organ that I have detected, and it is the only one to which a branch of a cerebro-spinal nerve has been traced." This branch is the genital branch of the genito-crural nerve.

It is quite possible that the cerebro-spinal nerves may some day be found to penetrate deeper, and to supply other serous membranes, but, so far, Mackenzie has been unable, as have others, to trace the intercostal nerves to the pleura or the pericardium.

In ulcerated stomach it is usually imagined that the tender spot in the epigastrium represents the seat of the ulcer. Mackenzie has shown that this is not the case. The pain is referred, and the ulcer may be some distance off from the painful spot. Similarly in stones in the gall-bladder and kidney ; although pain may be felt over these organs, it is reflex in its nature, and depends on muscular hyperalgesia associated with contraction of the unstriped muscular fibres in the ducts leading from the gall-bladder and kidney. The pain from the contraction of a hollow viscus may be referred to some distance from the contracting part.

In heart disease itself, apart from pericarditis, Head believes that pain may be local—"Local pain seems to be most often present when the heart is acting irregularly, and is peculiarly associated with a feeling of breathlessness." He believes also that the "pain felt in the organ itself is dull, heavy, and wearing, and not sharp, aching, and stabbing, like the referred pain." Mackenzie believes that cardiac pain is always referred, and is due to a sensory and motor reflex through the cord. A most interesting address has just been given by Sherrington, as President of the Anatomical and Physiological Sections of the British Medical Association, entitled, "The Deep Afferents—their Distribution and Function," wherein he describes his recent experimental observations on these nerves.

In conclusion, let me add that, on reviewing this subject in the light of modern investigation, there is much that goes to prove that

visceral pain is always referred—a view which Mackenzie has for many years upheld.

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SURGERY.

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Transplantation.

Several interesting articles have recently appeared on this subject. The structures transplanted include bones and joints, arteries and veins, thyroid gland and kidney. Such organs have been experimentally removed from an animal and immediately reimplanted, or have been transplanted from one animal to another of the same or of a different species. The attempt has also been made, in some cases successfully, to transplant tissues into the living human subject from an animal or from a dead body or amputated limb.

Transplantation of Joints.—Lexer discusses this subject in detail (*Arch. f. klin. Chir.*, Band xc. Heft 2), with special reference to the knee joint, in such cases, for example, as those in which the lower end of the femur or the upper end of the tibia has been removed for a myeloma. A flap incision should be made, as a fistula is apt to form if the skin incision is directly over the implanted joint. The preparation of the joint defect, as by removal of a synostosis, pseudarthrosis, or bone tumour, is best done without a tourniquet, so as to minimise reactionary bleeding. Although curving the bone surfaces may prevent rotation, it is wiser to saw them transversely, as absolute accuracy of apposition of the sawn surfaces is essential. Any remains of synovial membrane and attachments of tendons in the defective joint should be retained and attached to the implanted bones. The new joint, according to the present practice, is removed from a freshly amputated limb, which must not, of course, have been the subject of any infective condition or malignant tumour. From it ligaments, tendon insertions, fat and muscles are all stripped, leaving the periosteum, but the crucial ligaments and cartilages of the knee may be left. Each piece of bone is, as a rule, of about the thickness of one to two fingers, though as much as half of the diaphysis has been transferred. In cases where there is not a trace of synovial membrane left in the affected joint, it becomes a difficult and doubtful question whether the synovial membrane of the implanted joint should be transferred along with the bones, or at a later operation, or not at all, and whether any better substitute for the synovial membrane can be used. On the one hand, if bone and cartilage alone be present, connective tissue may grow into the joint interval and gradually destroy the cartilage; but successful cases are recorded, and synovial membrane can undoubtedly form, as occurs in false joints after fracture. On the other hand, the transference of synovial membrane with the bone is open to the serious

objection that it enormously diminishes the surface of contact of the implanted bone with the surrounding tissue from which its nourishment must be derived, and thus renders necrosis more probable. Hence primary implantation of bone and cartilage only, followed by secondary synovial implantation at a subsequent operation, is theoretically to be preferred. No satisfactory results have been obtained from various substitutes for synovial membrane, such as hydrocele membrane, peritoneum, omentum or dura mater.

Artificial methods of fixing the implanted bones, as by nails, wire, or ivory pins, are to be avoided, as granulation tissue grows in along the foreign body, and is apt to cause absorption of bone. If fixation, however, be necessary, the best method is by means of thin pegs made from fresh bone.

In many cases the muscles around the defective joint have been destroyed, and then plastic operations are necessary in order to secure a properly functioning articulation. As it is often extremely difficult to change the insertions of the existing muscles, attempts have been made to transplant tendons also from freshly amputated limbs, and the results have been gratifying. The after-treatment in joint-transplantation is carried out on general principles—massage, baths, and so on. Movements are begun when the bones have united; walking follows later. Lateral mobility may necessitate for a time the use of supporting apparatus. There are often creakings in the joint, like those of arthritis deformans, but they greatly diminish with increased use. Movements are painless. Several cases are quoted where a useful limb has been secured, which would have been otherwise impossible, but there have also been a proportionally considerable number of failures.

Owing to the difficulty of obtaining healthy joints for transplantation purposes, the question naturally arises whether a joint removed from a person soon after death is suitable, and this at once raises the further question whether the bones of a dead body remain sterile for any length of time. An investigation by Bergemann is published in the same journal as Lexer's article just quoted. It had previously been established that the bone-marrow of persons who had died of a bacterial disease frequently contained that organism, but in pure culture, not mixed with B. coli or saprophytes. Bergemann, having in view the possibility of joint-transplantation from the cadaver, confined his experiments to the adjacent ends of femur and tibia, inoculating tubes and plates in all cases from the tissue over the periosteum, from the cancellous tissue, and from the marrow of the medullary cavity. Inoculations were first made from 6 to 18 hours after death, and repeated at intervals of about 24 hours while the body was available. All cases of death from a general bacterial infection were, of course, excluded. Although inoculations were made up to, in some cases, 40

to 54 hours after death, the bones remained, with one doubtful exception, sterile. Apparently sterility of the bones may be confidently expected within any period after death at which transplantation would be feasible. Lexer, however, emphasises the extreme difficulty of aseptically removing a joint from a dead body and transferring it to a patient. In one case he attempted it, and a severe streptococcal infection resulted.

Transplantation of Blood-Vessels.—Von Borst and Enderlen (*Deutsche Zeitschr. f. Chir.*, Band xcix. Hefte 1 and 2) give a long account of their own experiments, with a summary of previous experimental investigations regarding vessels and various organs. Three variations are possible—(1) Auto-implantation, where a vessel or organ is removed and at once reimplanted in the same or a different region of the same animal. (2) Homoio-transplantation, where a transplantation is made from one animal to another of the same species. (3) Hetero-transplantation, where the transference is to an animal of a different species. Failures in implantation of vessels are due to necrosis of the vessel wall or thrombosis and obliteration of the vessel, while, at a later stage, aneurysmal dilatation may occur. Sometimes the experiment consisted in excising a portion of a vessel and stitching in a portion from another vessel; at other times an excised organ, such as the thyroid gland or the kidney, was reimplanted or transplanted, its vessels—arteries and veins—being stitched either to corresponding vessels on the other side of the body or to entirely different vessels. For example, the thyroid artery might be stitched to the axillary or iliac, and the renal to the splenic.

Auto-implantation resulted, in many cases, in perfect microscopical and functional results, the implanted segment uniting with the original vessel. Homoio- and hetero-transplantation also may be completely successful, but histological examination shows that the implanted vessel does not itself remain unchanged, but that its tissue is gradually replaced by the tissue of the animal itself, destruction being so slow that the substitution of new material is able, except in the case of large vessels, to keep pace with it. When a portion of an artery is implanted into a vein, or *vice versâ*, the wall of the implanted segment alters its thickness so as to approximate to that of the vessel into which it has been inserted.

Transplantation of the Thyroid Gland.—At first, pieces of the thyroid were simply placed in various situations—in the subcutaneous tissue, in the substance of muscles, in the peritoneal cavity, either free or wrapped in omentum, or in bone-marrow—but without permanent result. With the advance in the technique of suture of arteries, it became possible to implant the whole thyroid gland, uniting its arteries and veins to those of the animal or person into whom it was placed, and thus reconstituting its circulation. The authors found the chief difficulty in the junction of

the veins, and failure in this meant inevitable necrosis of the thyroid. In many cases, however, the vascular suturing was successful, and the results of their experiments, which included transference from one human being to another, can be given in a sentence. Auto-implantation (thyroid reimplanted elsewhere in the same animal) gave a number of successes; homoio- and hetero-transplantation (transplantation to another animal of the same or of a different species) resulted invariably in failure, the transplanted gland diminishing and disappearing.

Transplantation of Kidney. — The renal vessels are united to the splenic, iliac, or other suitable vessel, preferably where the ureter can be inserted into the bladder, for in cases where the vessels of the neck were employed, and the ureter was brought out through the skin, death of the animal from pyonephrosis resulted. Sometimes, instead of dividing the renal vessels, the portions of aorta and vena cava were removed with them. The results are practically the same as those with the thyroid gland. A kidney can be successfully implanted in another part of the same animal, as is proved by the fact that the other kidney can be removed at the same time, or at a subsequent operation, without any effect on the animal's health. Homoio-transplantation and hetero-transplantation result in all cases in necrosis of the transplanted kidney; in the former the kidney may apparently act for a certain time, even for several months, but eventually shrivels and becomes functionless.

The results of these transplantation experiments in animals would seem to suggest that the serum of any animal exercises a destructive biochemical action on any organ transplanted from an animal of another species, and that the same thing applies, though the action may be slower, in the case of two animals of the same species. If this be true, we cannot look to animals for the supply of organs to take the place of those in the human subject, and consequently the question of the possibility of transference from a human body shortly after death assumes greater importance.

DISEASES OF CHILDREN.

By G. H. MELVILLE DUNLOP, M.D., F.R.C.P.,
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The Distribution of Tuberculous Lesions in Infants and Young Children.

In view of the interest taken in the question regarding the manner of infection and the localisation of tuberculous lesions in the human subject, the following analysis by Martha Wollstein, New York (*Arch. Int. Med.*, 1909), from the post-mortem records of the Babies' Hospital, New York, is one of considerable importance. From 1889 to 1908,

1131 autopsies were performed, of which 185 or 16·4 per cent. showed tuberculosis of one or more organs. From these statistics, we learn that 13 per cent. of all infants under 1 year appearing on the post-mortem table showed tuberculous lesions, while 36 per cent. of those between 1 and 2 years, and 32 per cent. of those over 2 years, were so affected. Of the infants under 3 months of age, only 1·8 per cent. showed evidence of tuberculosis.

The following is a brief summary of the more important facts brought forward in this paper :—

In the series of 185 cases showing tuberculosis at the autopsy, there were 13 in which the tuberculous lesions were limited to the respiratory tract, and only 1 involving the intestines alone. The point of entrance for those 14 cases was clearly in the lungs 13 times, and once only in the intestinal tract. Four additional cases were of undoubted intestinal origin, 40 of respiratory, and 1 of mixed respiratory and intestinal infection. In the more advanced generalised cases 10 were possibly of intestinal origin, including 8 in which the mesenteric lymph nodes were involved without a tuberculous lesion of the intestines. In the majority of cases of extensively generalised tuberculosis in young children the exact point of entrance must remain in doubt, although the lungs were involved more frequently than any other organ (in 96 per cent. of all cases). This proves their marked predisposition to tuberculosis, rather than their primary infection.

This study proves how comparatively rare undoubted cases of intestinal tuberculosis were in this series of infants and in children under 3 years of age, and how, even when due allowance has been made for all doubtful cases, tuberculosis of respiratory origin predominated over that due to ingestion of the bacillus.

Certain Cases of Acute Tremor occurring in Children.

In an interesting monograph on this subject (*Brain*, May 1909), Reginald Miller reports half a dozen cases, and gives his reasons for considering them as examples of encephalitis of the mid-brain and its connections.

Previously where cases of this description have been reported they have been grouped as cases of cerebellar encephalitis—a view to which the author takes exception. At its outset the tremor is slow, regular, and increased on voluntary movement, and when severe it is continuous during sleep. When slight, it only shows itself during voluntary movement or during periods of excitement. It may be universal in the muscles of the head, trunk, abdomen and limbs, and is more marked in the proximal than in the peripheral parts of the extremities. In some cases the child gives the appearance of one shivering all over from cold. In rate the tremor is about five oscilla-

tions a second. Combined with tremor is hypertonus, giving to the limbs a certain degree of uselessness, and rendering their movements slow and awkward, and this in the absence of any true spasticity. There is little or no real loss of power. In addition, there may be other signs present from the presence of other foci of disease elsewhere in the central nervous system. The important points in these cases are three in number—the acute onset, the tremor, and the hypertonus —differentiating the condition from cerebellar encephalitis, in which ataxia and hypotonus are found, with the possible addition of nystagmus and scanning speech. In support of his contention that these are cases of polio-encephalitis indicating a disease of the brain similar to that which is known as acute poliomyelitis affecting the spinal cord, he brings forward clinical evidence showing that certain well-marked characteristics which occur in cases of poliomyelitis are reproduced in these cases of polio-encephalitis.

Thus in both conditions the disease attacks fat robust children and spares the thin and delicate. The seasonal incidence corresponds in both. The age of the cases attacked, viz. from 1 to 4, is the same in both. As in poliomyelitis, the amount of constitutional disturbance at the onset is very variable, although convulsions and unconsciousness are of more common occurrence in cases of tremor. In both conditions the onset is acute and the maximum harm is done within a few hours. In both the tendency is towards improvement or total recovery, while relapses are very uncommon. Examination of the cerebro-spinal fluid gives negative results, as in the spinal cases.

It is not maintained that all cases of acute tremor are to be regarded as due to polio-encephalitis, but that only certain ones are to be placed in this group. The diagnosis can, to a large extent, be made by the exclusion of other possibilities, and by a consideration of the etiological factors already referred to.

The most likely causes apart from polio-encephalitis are a tuberculous tumour or a thrombosis due to a syphilitic endarteritis.

There is a general tendency towards improvement in the tremor in almost all the cases, but unfortunately the mental deficiency which so frequently accompanies the tremor generally undergoes no improvement.

Epidemiology of Acute Poliomyelitis.

Emmett, Holt, and Bartlett of New York, in a recent number (*Amer. Journ. Med. Sci.*), have collected reports of 35 epidemics of poliomyelitis previous to the year 1907.

These epidemics have been widely scattered over the civilised world, but 5 of the most extensive have occurred in Norway during the last 10 years. The number of cases has varied greatly in the different

epidemics, but in most of them the numbers have been small, varying from 20 to 719 cases.

The seasonal occurrence of epidemics has been strikingly uniform, the most frequent months being July, August, and September, and in almost every instance the epidemic terminated with the month of October.

Considerable attention has been devoted to the question whether the disease is apt to recur in a locality after an epidemic. From the evidence obtainable it seems very improbable that any increase in the number of sporadic cases usually follows an epidemic. Topographical location and hygienic surroundings appear to have little influence upon the occurrence of epidemics. Town and country seem to be equally susceptible to epidemics, and in the majority of instances it is mentioned that the hygienic surroundings were good.

The association of poliomyelitis with diseases other than those of the nervous system is mentioned in only a few of the epidemics, and this evidently with a bias to its relation. In most of the cases the definite statement is made that the children were in good health when they were taken ill.

When poliomyelitis occurs as a sporadic disease the danger to life is very slight, but a study of the epidemics shows a very different result. Out of 1659 cases there were 201 deaths, a mortality of 12·1 per cent. The discrepancy between those figures and those relating to the sporadic form is explained by the fact that cases with bulbar symptoms which constitute most of the fatal cases in epidemics have not been recognised as poliomyelitis where occurring in scattered instances. The greater majority of cases attacked with acute poliomyelitis in epidemics were children under 4 years of age, just as is seen when the disease occurs sporadically, but in epidemics a larger proportion of older children and adults are attacked than at other times. The occurrence of epidemics and the relation of certain groups of cases to one another in these epidemics place beyond question the statement that acute poliomyelitis is an infectious disease. Whether it is possible to go further and state that the disease is communicated is an open question. After carefully considering all the evidence brought forward, the authors cannot resist the conclusion that the disease is communicable, though only to a very slight degree, one of the most striking facts being in the development of second cases within 10 days of exposure. Positive statements on this point must, however, be deferred until the discovery of the infective agent.

OPHTHALMOLOGY.

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Gonorrhœa affecting the Conjunctiva.

Metastatic gonorrhœal conjunctivitis is a manifestation of the systemic results of gonorrhœal infection which continues to present certain difficulties of explanation. It must be clearly understood that there is no question in this affection of direct transference to the conjunctival mucous membrane—*that* produces a totally different clinical picture. In this affection, some time after the onset of acute invasion of the urethra the patient is attacked by a somewhat acute conjunctivitis, usually bilateral. Though smart, this muco-purulent conjunctivitis does not in the least approach in severity the more generally recognised form which arises by direct transference. At the same time it is usual for the patient to suffer from rheumatism in some joint or joints. Though this form has now been recognised for some considerable time, there is but little information as to the mode of its production, and in particular as to the bacteriology of the discharge from the conjunctiva. Some of the work previously carried out along this line has been, to a certain extent, discounted as our knowledge of the flora of the conjunctiva has increased. M'Kee (Montreal) has recently done some interesting work in this connection. Before we deal with this new contribution, it may be well to mention that there are at present three theories as to the origin of the secondary development, viz. that it is due to gonotoxin, that there is a mixed infection, and that the gonococcus is conveyed by blood-vessels or otherwise from the site of primary infection through the body to the conjunctiva. This last theory has strong support from those who have found, or believe they have found, the true gonococcus in the conjunctival secretion. In the case which supplied the material on which M'Kee made his observations, the symptoms and course were typical and need not be recounted here. At the first appearance of the patient it was only after eighteen slides were prepared and searched that one could be found showing a very few Gram-negative diplococci in or upon leucocytes. On tubes neither of plain agar, blood serum, hæmoglobin, nor hydrocele fluid could any growth be obtained at first, but after twenty-four hours a profuse growth was seen on the hæmoglobin agar. This turned out to be chiefly bacillus xerosis, but within were somewhat different areas from which Gram-negative diplococci were obtained, which M'Kee was able to isolate. He was able to contrast the organism with micrococcus catarrhalis obtained from the nose, with a cerebro-spinal meningococcus, and with a urethral gonococcus, and found that from these and from the saprophytic Gram-negative diplo-

cocci this organism differed in cultural features, morphology, and sugar reaction. Further, he removed a snipping from the conjunctival tissue, but searched in vain for micro-organisms in the tissue; in the blood-vessels, however, he found abundant polymorphonuclear leucocytes, which may be of significance inasmuch as it has been suggested that the gonococci are conveyed in emboli to the site of metastatic inflammation. The difficulties encountered by M'Kee were very great, and it was only after much apparently unsuccessful work that he at last achieved success in demonstrating, where many have entirely failed, the existence of gonococci in the conjunctival secretion, and in thus proving the truth of the third theory mentioned above, viz. that the affection is a true metastasis.

When we turn to the subject of the more usual form of gonorrhœal conjunctivitis, and in particular to the treatment of it, we find the warfare still going briskly on between nitrate of silver and the newer compounds of silver. Each of the two chief organic salts of silver, namely protargol and argyrol, is admittedly less irritating than is the nitrate, and each of them is richer in silver; with the advocates for them it appears to be received as a truth from Heaven that the silver element is the effective partner in the combination (though why this should be is not manifest), and that the organic salt is on that account superior to the inorganic, and they also proudly point to the fact that their preparations may be used in a strength greatly exceeding that in which the nitrate can be employed. Is this not, however, a sign rather of relative inefficiency than of efficiency? Nitrate of silver is an antiseptic so powerful that it must be used in very weak concentration, and it seems to be the case that if that is exceeded it may defeat its own ends. For a catarrhal condition of the conjunctiva may be set up by the irritation thus started, and the membrane thus become a better seed-plot for the growth of any gonococci which may have escaped the influence of the solution.

Ophthalmia neonatorum, or purulent inflammation of the eyes of infants, which is definitely gonorrhœal in origin in approximately $\frac{2}{3}$ of the cases, is a very serious cause of personal and national loss, as is very well known. There are far too many children, even at this day, losing sight in infancy and becoming burdens on the country, who could, by judicious and timely treatment, be happier and more useful citizens. The public are gradually awakening to the fact, a sign of which is that in several communities steps are now being taken to have the cases reported to the Public Health Authorities as contagious, and to have negligence in the care of them punished. In certain States of the American Union (perhaps in this country also, but I am not aware of it) the simple expedient has been tried with good effect of reporting the matter of a child being neglected by the midwife to the agent of the local Society for the Prevention of Cruelty to Children; the case

has then been taken up by them and prosecution carried on. It is true that in some of these instances the punishment meted out has not been very severe, but the real gain is in the publicity, in the recognition by all that to neglect the infant and allow it to become blind is an offence, because it is a wanton and preventable injury to a helpless creature: the mere arrest of one midwife warns other midwives and nurses, and educates the public also, for they are taught by this occurrence that redness and inflammation of the eyes constitute a lively danger, and they are the more ready to call in assistance of the proper kind and at the proper time. What is really desired is not so much punishment of the offender as prevention of the offence. In Edinburgh we are fortunate in that we see but little of the malady as compared with some places, but there are parts of the country where matters are far more serious, and where the wastage of human activity and happiness is much greater.

Apropos of this disease, some of our contemporary writers are much exercised over the term "ophthalmia neonatorum," the use of which ought, they say, to be given up at once as unscientific and antiquated, leading even to a failure to appreciate the gravity of the disease! "Purulent conjunctivitis" is the term which they wish substituted. The point is not one of very much importance, but to our mind the advocates of this prodigious revolution have hardly justified it. For while "ophthalmia" is a vague term indicating inflammation of the eye —any part of it or all of it—to call the disease "conjunctivitis" is to limit your expression to inflammation of a relatively unimportant part. It is not the inflammation of the conjunctiva *per se* which does harm, but the destruction of the cornea. To name the affection "purulent conjunctivitis" is then to focus the attention upon the relatively unimportant; "ophthalmia," therefore, in virtue of its more general range, the very quality for which it is attacked, remains the better word.

The whole question of ophthalmia neonatorum, touching so closely upon the vastly important subject of the prevention of blindness, has a perpetual and urgent interest. The constant and serious danger from infection at birth was discussed at the International Conference on the Blind which was held last year in Manchester. A committee had been appointed which, unfortunately, consisted entirely of persons connected with the care of the blind in institutions and with their education, but they promptly co-opted two ophthalmic surgeons as members and issued certain recommendations, one of which urged the Public Health Authorities to adopt the Early Notification of Births Act, and another expressed the view that "Ophthalmia of the Newborn" should be added to the list of diseases compulsorily notifiable as an infectious disease. They further set forth their opinion that more definite teaching should be given to midwives upon the seriousness of

inflammation of the infant's eyes, and drew the attention of the Central Midwives' Board to the desirability of more stringent instructions in regard to the duties of the midwife when "whites" should exist. With the improvement of the educational equipment of the midwife which has been going on of late, and with the comparative falling off in the number of births attended solely by an ignorant "neighbour," there ought to be a diminution in the number of cases of ophthalmia. It is gratifying to learn that there appears to be a tendency for cases to decrease, even though the decrease is but slight: we take this statement from the report of a joint-committee composed of members of the British Medical Association, of the Royal Society of Medicine (Sections on Obstetrics and on Diseases of Children), of the Ophthalmological Society, and of the Incorporated Society of Medical Officers of Health; even with this decrease, however, it seems to be still true that ophthalmia neonatorum accounts for about 10 per cent. of all cases of blindness, and for more than 30 per cent. of the blindness in British Blind Schools. This committee further recommended certain "Administrative and Educative Measures," into the details of which we can hardly enter here: it is sufficient to say that compulsory notification was recommended; that the Local Sanitary Authority should be liable to be called upon to arrange for efficient treatment, and that on the staff of every Maternity Hospital an ophthalmic surgeon should have a place; there ought to be a skilled person to whom the midwifery staff can look for advice alike skilful and prompt: with this suggestion, at least, we are in hearty accord. There are other suggestions of a similar kind, such as the instruction of midwives under the Board in the dangers of "whites," &c. Further, the committee suggested certain remedial measures to be employed when the disease threatens or is obviously present, but on these it is needless to dwell, because when the recommendations were voted upon in the Association that section of the report was deleted which contains "suggestions to medical practitioners." The portion, however, stands good which deals with the proper procedure in normal cases, in cases in which the expectant mother suffers from a purulent vaginal discharge, and in cases in which the disease has actually become established. In the "presumably normal" cases, dry wiping of the face and eyes is urged, and the application of nitrate of silver discouraged.

DERMATOLOGY.

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The Nature of Tuberculides.

The group of skin eruptions known as tuberculides has of recent years been the subject of very numerous papers. The commonest of these eruptions is that of lichen scrofulosorum, which consists of small reddish-brown papules, scaly on the surface. These papules are arranged in groups, and usually distributed according to the follicles. Occasionally the inflammation is more and the hyperkeratosis less marked, and the condition has then been described as eczema scrofulosorum. Both these forms occur usually on the sides of the trunk. Another form of eruption, which is rarer, and usually affects the extremities more than the trunk, is the papulo-necrotic tuberculide, which consists of isolated papules of red-violet colour, showing a small central suppuration, which rapidly goes on to necrosis. The small necrotic area becomes scabbed over, and when the scab falls off, a minute, often pigmented scar is left. The third form is the largest, is not uncommon, and is known as erythema induratum scrofulosorum (Bazin's Disease), is seen usually on the legs of young girls, and consists of large oval or rounded purplish swellings, of slow evolution, and tending to ulcerate.

All these tuberculides resemble each other in that they occur in patients suffering from some form of chronic tuberculosis of mild type. They do not occur in rapidly advancing or far-advanced tuberculosis. They all evolve slowly, tend to vanish and reappear. It is well, also, to remember that intermediate forms occur between the three typical varieties described.

The causation of these eruptions is a still much-discussed problem. For long they were looked on as toxi-tuberculides, *i.e.* due to the absorption of the toxines of the tubercle bacillus from some focus in the internal organs, but recent investigation has shown that our views on that point must be somewhat modified. Nobl, at a meeting of the Vienna Dermatological Society this year (*Dermat. Zeitsch.*, xvi. Heft 4), showed five cases which clinically looked like typical lichen scrofulosorum, yet in which, in reality, the eruption was due to the rubbing into the skin of an ointment containing tuberculin. This reaction was first described by Moro, and is known as Moro's, or the percutaneous reaction. Nobl's five cases all suffered from tuberculous disease, either of glands, bones, or skin. Into the skin of the left breast he rubbed a 10 per cent. oint-

ment of Koch's old tuberculin, and within twenty-four hours a crop of soft papules appeared. These papules occurred not only on the area rubbed, but extended also beyond its limits. After a few days these papules became scaly, drier, and covered with brownish scabs. These lesions retrogressed very slowly, and after some weeks exhibited a marked resemblance to the scaly, dry eruption of lichen scrofulosorum, especially as there was a marked follicular hyperkeratosis. In some cases the eruption became generalised. It differed from an ordinary lichen scrofulosorum in tending to show pustulation in the scaly stages. This artificially produced eruption resembles lichen scrofulosorum in that after it has disappeared it can be made to recur by the subcutaneous injection of tuberculin. Advanced cases of tuberculosis, also, do not give the percutaneous reaction at all, and, as already stated, lichen scrofulosorum does not occur in advanced tuberculosis. Nobl considers that lichen scrofulosorum is, like the percutaneous reaction, a manifestation of purely toxic origin, because both these conditions are similar clinically and histologically. But his conclusions are hardly justified, as tuberculin does not consist entirely of the toxines of the tubercle bacillus, but also contains some of the bodies of the tubercle bacilli. In order to elucidate this latter point, Zieler (*Münch. med. Wochenschr.*, 11th August 1908) has used old tuberculin which has been entirely freed from bacilli by centrifugalisation and filtration. In such solutions no tubercle bacilli or fragments of bacilli were to be found on the most careful examination, and in order further to avoid the possibility of any bodies of bacilli being present, Zieler suspended tuberculin enclosed in collodion capsules at 37° C. in sterile water for various lengths of time, and used the dialysate. Control experiments were performed, and it was found that the tuberculin dialysate only gave positive results. Thus tuberculin absolutely free from any trace of bacilli, when injected into the skin, produces lesions of definitely tuberculous structure. Zieler, therefore, claims that tuberculous changes can be produced by toxines which are derived from the tubercle bacillus, and supports the old theory of the purely toxic origin of tuberculides.

In order to try to throw further light on the origin of these tuberculides, Gougerot and Laroche (*Archiv. de Med. Experim. et d'Anat. Path.*, September 1908) have resorted to animal experiments. Into an epilated area of the skin of a guinea-pig they rubbed a virulent culture of tubercle bacilli, and after an incubation period of three or four weeks, lesions identical with the papulo-necrotic tuberculide gradually developed, and passed through the same stages of evolution as in the human subject. Other tuberculides were similarly produced, *e.g.* lichen scrofulosorum, eczema scrofulosorum, erythema induratum, and lesions like lupus erythematosus, but in the great majority of cases the lesions produced were of the nature of lichen scrofulosorum or the papulo-necrotic tuberculide. Microscopically, these lesions showed a central necrosis with a narrow

peripheral zone of cell proliferation. In those lesions resembling lichen scrofulosorum and erythema induratum, the outlying foci showed giant cells. Similar tuberculides were also produced by rubbing into the skin of guinea-pigs dead or attenuated cultures of tubercle bacilli. The authors claim that these experimentally produced tuberculides are clinically and microscopically identical with the human tuberculides. They also found, as in human tuberculides, that it is very difficult to discover tubercle bacilli in them, and that when pieces of these artificially produced tuberculides were injected into animals they only produced tuberculosis in half of the cases. The authors bring forward a new theory, viz. that tuberculides are due to the inoculation of scanty but virulent tubercle bacilli through the healthy skin of non-tuberculous individuals, or to the inoculation of dead or attenuated tubercle bacilli through the skin of tuberculous individuals. They also mention that this theory does not necessarily contradict the theory of the production of tuberculides by the inoculation of dead or attenuated bacilli through the blood-stream of tuberculous individuals.

A Simple Treatment of Lupus Vulgaris.

A method of treating lupus vulgaris in private practice, which is easily carried out, is little painful, does not demand the expenditure of much time on the patient's part, nor, on the ordinary practitioner's, the purchase of costly apparatus, has been hitherto, as Boeck observes (*Monatsh. f. Prakt. Dermat.*, 15th May 1909, Hamburg), a desideratum. He has therefore devoted himself during the last two years to devise such a plan. Of all the caustics, pyrogallic acid has proved the most reliable, but, either in plaster or salve, has certain disadvantages. He has found that when compounded with a mucilaginous excipient, so prepared as to dry rapidly, nearly all requirements are fulfilled, so that it could even be used for the eyelids. Of all the bases experimented with, gelanthum has most commended itself. The formula of widest applicability is as follows:—R Acidi pyrogallici; Resorcini; Acidi salicylici, āā 7·00; Gelanthi; Talci pulv. āā 5·00. M. F. pasta mollis. The mixture is then spread thickly, by means of a small paper-knife, on the affected part, and covered with an extremely thin, transparent film of cotton wool. The application dries quickly, and should be left undisturbed for some days, a week, or even considerably longer. In most cases he allows it to remain for at least a week untouched. A scanty, thin fluid may ooze from the edge of the covering for a day or two, which ought to be wiped away. The destruction of the lupus area proceeds imperceptibly and painlessly, provided that there was no raw surface originally present. But even then pain can almost be wholly obviated if, previous to the mucilage being laid on, the part is moistened for a few minutes with a 5 per cent. solution of novocain, and covered

with a thick layer of anæsthesin. Since, in general, repetition of the procedure is necessary, the first dressing should, in course of a week, be softened and removed by covering it with unguentum vaselini plumbicum, and continuing the lead salve till healing is complete.

The Diagnosis between Lichen Planus, Lupus Erythematosus, and Leucokeratosis of the Buccal Mucous Membrane.

In an instructive paper by Fordyce (*New York Med. Journ.*, 6th March 1909), among various other points, we find this touched on. While, in lichen planus, we may have lesions in the mouth preceding or following the cutaneous outbreak, occasionally the mucous membrane is alone involved. Here, if seen in the early stage, the initial papule is the size of a pin's head or smaller, hemispherical, conical, or flattened, hard to the touch, and arising from a sound mucous membrane. Coalescence soon takes place, however, forming plaques differing in size and configuration, appearing round or oval, as white streaks converging to give stellate figures, or arranged as a mosaic or arborescence. The surface is rough and irregular. It is very refractory to treatment, persisting for years or disappearing and relapsing. The cutaneous and mucous alterations exhibit a picture not easy to distinguish from syphilis. The therapeutic test is of no value, as the disease is also favourably influenced by mercury. Search should be made for pinhead-sized, white-topped lesions lying in the neighbourhood of the patches, or, in a doubtful case, a microscopic examination may be resorted to, the histology being identical with the integumentary lesion. Lupus erythematosus involves the mucous membranes, either by direct extension from the face to the lips, or it occurs in the mouth, pharynx, or larynx, independent of any cutaneous eruption. In his experience, after the lips, it is met with most frequently on the buccal mucous membrane. When the lips are first involved, they are swollen, purplish-red, and eroded, but later become dry and scaly, and finally show an atrophic greyish-white centre surrounded by a hyperæmic zone, like typical lesions on the face. On the cheeks the early appearance is much the same, but later greyish-white streaks are seen, resembling those produced by brushing the surface with silver nitrate. By many, all white patches met with in the mouth, whether due to lichen planus, lupus erythematosus, the sequelæ of syphilitic lesions, or otherwise, are grouped together under the heading of leucokeratosis. He summarises his impressions thus. Alterations of the surface epithelium, accompanied by a certain amount of underlying inflammation, may be produced from the irritation of tobacco smoke in subjects who have never had syphilis, the amount of smoke necessary to occasion this condition being altogether an individual matter dependent on the susceptibility of the mucous surface.

We get similar alterations in the superficial epithelium in subjects who have had relapsing mucous patches of these regions, which alteration is more frequent if the syphilitic lesions are irritated by tobacco smoke. In susceptible persons leucokeratosis of the mucous membranes might be evoked by the rough edges of a tooth.

A New Variety of Cutaneous Discomycosis.

Foulerton, in 1890 (*Brit. Journ. Dermat.*), showed that conditions resembling actinomycosis might be produced by a streptothrix. Since then attention has been drawn to peculiar lesions evoked by different sporotrices, and now Ravant and Pinoy (*Ann. de Dermat. et de Syph.*, July 1909, Paris) record a case with special features, apparently due to a discomyces. The patient was a man of 45, who had always lived in Paris. Six weeks before his admission to hospital, he experienced dull pains in his arms and limbs, unaccompanied by any other symptom. Soon there appeared on the leg and shoulder subcutaneous and intra-muscular nodules, painful on pressure. These, at first small and hard, rapidly increased in volume, new ones showed themselves in various parts, while in a short time some suppurated and burst, discharging pus containing blood and clots. Finally other deep lesions ensued, periostitis, ostitis, and synovitis, as well as large intra-muscular and subcutaneous abscesses. Round the fistulæ so produced, the skin assumed a dark wine hue, fairly well-defined at its margin, accompanied with some thickening, while exuberant granulations rose round the openings. In the granulations were embedded little, white, miliary bodies. Smears from the pus showed, when treated with largin, very fine bacilli, having a clear central space and coloured extremities, while the grains were constituted of the same bacilli agglutinated into rosettes. No thread forms or clubs were observed in the smears, but the grains were composed at the periphery of clubs, and in the centre of very fine threads or minute bacilli. This organism proved to be a discomyces, related to that of actinomycosis, and to it the authors desire to attach the name of Discomyces Thibiergi. In the light of these and other researches, one ought, therefore, to speak now, not of actinomycosis, but of actinomycoses. The most various parasites appear capable of giving rise to actinomycotic forms. In the case in question, under full doses of iodide internally, supplemented by incisions and erasion locally, the existing lesions healed, though somewhat slowly, and the commencing ones aborted without suppurating.

DISEASES OF THE EAR, NOSE AND LARYNX.

By A. LOGAN TURNER, M.D.(Edin.), F.R.C.S.(Edin.),
and
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Enucleation of the Faucial Tonsils.

A good deal has been written recently as to the best method of removing the faucial tonsils, and also as to what is to be looked on as disease of that organ sufficient to require removal. There is a growing tendency among specialists to condemn the widespread method of removal with the guillotine in favour of a more radical operation.

To intelligently appreciate the arguments of the advocates of this more radical method, it is necessary to consider first the development and the anatomical varieties of the tonsil. An interesting account will be found in a paper by Hett (*Lancet*, 13th February 1909).

The tonsils are developed in the second cleft recess in the fourth month of fœtal life. The faucial pillars are parts of the second and third bronchial arches.

The hypoblastic recess ends under cover of the soft palate as the supratonsillar fossa; on its outer wall the tonsil develops. In the human fœtus of the fourth month the tonsil is an oval mass, divided by a ridge into an anterior and posterior mass. At birth the tonsil consists of three masses separated by two furrows. The tonsils of mammals present an interesting evolutionary species.

In infants and small children the tonsils are deeply-imbedded structures due to proliferation in the deeper parts of the tonsillar mass. As life goes on and the lymphoid tissue atrophies they assume a flattened form.

If inflammation occurs, they may enlarge in various ways. Clinically, Hett distinguishes—(1) The imbedded tonsil; (2) the projecting tonsil; (3) the flat tonsil; (4) the hanging tonsil; (5) the tonsil with preponderance of the anterior middle or posterior masses, or a combination of these; (6) the tonsil with marked lingual projection.

The connection between the supratonsillar fossa and peritonsillar abscess was pointed out by Paterson a number of years ago.

With regard to the bearing of the anatomy of the tonsil to the technique of successful removal, it must be recognised—(1) that sepsis not size is the factor determining surgical removal. (2) The fact that a tonsil does not project is no proof that it is not enlarged. (3) That if a tonsil is removed in early life there is a marked tendency for the remains to proliferate. With this reservation, removal of a projecting or pendulous tonsil by a guillotine is usually successful if performed by an operator quite accustomed to its use. If a bit of tonsil is left, the

remains of lymphoid tissue may continue to form a nucleus of infection. Hence the ideal method is enucleation. In this operation the areolar space outside the tonsil is entered, and the gland is shelled out with its lingual projection.

Waugh (*Lancet*, May 1909) makes a plea for a radical operation, his conclusions being based on an experience of 900 cases. It is interesting to note that 143 of these cases had been subjected to one or more previous operations without being cured, and, further, that in 126 cases an operation was undertaken not because the tonsils were enlarged, but because the patients appeared to be suffering from some chronic toxæmia in which no other cause could be found except a septic tonsil. In this group there was no improvement in 12 cases, while in the remainder recovery was rapid and complete.

In discussing the question of tonsillotomy as performed with the guillotine versus tonsillectomy or complete removal, the surgeon should study the case from the point of view of the symptoms of his patient. Repeated attacks of inflammation, the recurrence of supratonsillar abscess, the frequent evacuation of fœtid secretion from the crypts, the absorption of rheumatic or septic products from the crypts, and the presence of tubercular cervical glands call for a thorough removal of the tonsillar tissue. Under such circumstances half measures do not prove satisfactory, but the whole tonsil with its capsule must be completely removed. The crypts extend into the substance of the tonsil as far as the capsule, and Waugh's figures regarding the frequent failure of tonsillotomy can be borne out by many observers.

When complete enucleation is advised, it becomes the duty of the surgeon to look upon the operation as something more than a simple procedure. The operation requires a little time for its performance, pain is not inconsiderable afterwards, and the possibility of hæmorrhage, sometimes of a troublesome character, must not be overlooked. It is very advisable that the patient should be kept quiet, preferably in bed, and travelling by train should be forbidden. A good deal has been said about the slight amount of hæmorrhage which follows complete removal of the tonsil, but too much reliance should not be placed upon a statement of this kind, because bleeding of a troublesome nature may and does occur after this operation, and the close attendance of the surgeon may be necessary. It is probable that the local use of adrenalin, in order to obtain a more bloodless field of operation, increases the liability of post-operative hæmorrhage, and it is for this reason that some surgeons do not employ it.

In adults, and it is this class of case that we are mainly considering, local anæsthesia is preferable. It is usually obtained by repeated swabbing of the surface of the tonsils and pillars of the fauces with crystals or strong solutions of cocaine, combined, in the practice of some, with the use of adrenalin. Yankauer of New York (*The*

Laryngoscope, May 1909) has described a method of anæsthetising the tonsillar region with a minimum amount of cocaine, by injecting the trunks of the sensory nerves passing to the soft palate. The nerves in question are the posterior palatine branches from Meckel's ganglion, and by injecting their trunks as they leave the bony openings in the palate, the entire region involved in tonsillectomy may be anæsthetised. Both the large and small posterior palatine nerves enter the mucous membrane of the palate through the foramina situated at the junction of the alveolar process with the horizontal plate of bone close to its posterior border. No special landmarks indicate the position of the nerve trunks, and the contour of the parts varies with the presence or absence of the last molar tooth. For purposes of injection, Yankauer gives the following measurements:—When the last molar tooth is present, he first measures one centimetre upwards from the posterior margin of the gum covering this tooth—in other words, at right angles to the free margin of the teeth. A second line, one centimetre in length, is then measured backwards from the termination of the first; the injection is made at this point. When the last molar is absent, the tip of the hamular process is located with the finger upon the soft palate as a sharp point of bone. A line, one centimetre in length, is then measured obliquely upwards and forwards; here the injection is made. A long needle is used, and should be introduced across the tongue, the syringe resting in the angle of the mouth upon the opposite side; the needle is inserted until its point is felt to touch the bone. Fifteen cubic centimetres of a 1 per cent. solution of cocaine are injected. Although the number of cases anæsthetised by the author in this way is not large, he is satisfied with the method; sufficiently good anæsthesia is obtained, rendering a general anæsthetic unnecessary. Five minutes after the injection the area of operation is ready.

While the technique of enucleation varies in different hands, and the instruments devised for its performance are numerous, there are two points which are essential for a successful operation. The upper part of the tonsil, that portion which is sometimes spoken of as the velar lobe, because of its situation in the velum pendulum palati, must be freed and pulled downwards; and, secondly, the loose areolar tissue outside the capsule of the tonsil must be opened into, so as to admit of its being shelled out. As the operation described by Yankauer in the paper already referred to effects the above requirements, a brief description of his method will not be out of place.

A vulsellum, without ring handles, a blunt separator, a pair of blunt-pointed scissors, curved on the flat, and a curved probe-pointed bistoury, or a cold snare, are the only instruments necessary. The tonsil is grasped firmly with the forceps and drawn towards the median line of the throat. The separator is then introduced into the supra-

tonsillar fossa, and again between the anterior pillar of the fauces and the tonsil, and moved about in such a way as to break down inflammatory adhesions between the pillar and the tonsil, and to free the velar lobe from its surroundings. Sometimes the pillars are so adherent over the upper part of the tonsil that it is necessary to use the scissors before the separator can be introduced. Having freed the upper lobe, the second step in the operation is then proceeded with. This consists in dividing the plica triangularis with the scissors at its junction with the anterior pillar. There is usually no difficulty in defining the union of the anterior pillar with the plica. After the division has been made the scissors are pushed in behind the pillar as far as their blunt points will permit, and during this procedure the traction upon the tonsil should be somewhat relaxed, so as to facilitate this part of the operation. In this way the attachment of the capsule of the tonsil to the posterior surface of the anterior pillar is divided, and the loose areolar tissue outside it is entered. The tonsil now becomes movable, and if downward traction be made upon it, the "shelling out" process commences, the pillars slipping outwards off the tonsil mass. Yankauer completes the operation by passing a powerful cold snare loop over the vulsellum, and as the wire is drawn tight, it readily passes through the loose tissue, and the separation and removal are completed. The snare is advocated so that hæmorrhage is diminished by the use of the blunt instrument. In the practice of the reviewers, a blunt-pointed curved bistoury is employed, while some advocate the use of the finger. The application of cold sterile water is of service as a hæmostatic. Tablets of orthoform may be sucked at intervals for the purpose of diminishing the dysphagia, while antiseptic sprays or gargles may be employed during the healing process.

INFECTIOUS DISEASES.

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Recent Observations on Epidemic Cerebro-spinal Meningitis.

Outbreaks of cerebro-spinal meningitis in Paris and at Evreux are the subject of communications to the French Academy of Medicine by Netter (*Bulletin de l'academie de médicine*, 4th May 1909) and Vaillard (*Bulletin de l'academie de médicine*, 27th April 1909). Their papers, as covering much the same ground, may conveniently be considered together. Of the two outbreaks, that studied by Vaillard at Evreux is perhaps the most interesting, and, occurring as it did in the barracks

of a dragoon regiment, gave the best opportunities for observing the *spread of infection*. Nineteen cases occurred among the soldiers between the 18th of January and the 1st of March, and of these the first five terminated fatally. Some interesting facts are noted regarding the relation of the different patients to each other. Four troopers who slept in the same room were successively attacked by the disease within a fortnight. Of these, three had occupied adjoining beds. In another room two cases were removed from adjoining beds, and two hospital patients contracted the disease, being apparently infected by the cases under treatment. So far as the town of Evreux was concerned, the outbreak was practically limited to the dragoons, only three other persons, all in frequent contact with the troops, suffering from the fever. It may be said then that, after the first case, all the persons attacked were known to have been exposed to others suffering from, or in contact with, the illness—an experience which must be most unusual. Netter, investigating eighty-two cases in the outbreak at Paris, was, on the other hand, only able to collect about ten in which contagion appeared to play any obvious part in the causation.

The most interesting feature of the Evreux outbreak is, however, the spread of the disease to country districts through the medium of "*carriers*." As it happened, two sets of reservists had been called up for training from the 8th to the 30th of January and from the 5th to the 15th of February. The first case of meningitis, as we have seen, occurred on the 18th of January, and the victim was one of the regular troopers. During both periods of training the reservists were quartered in the ordinary barrack-rooms, and mixed with the soldiers on the active list. Cases of meningitis occurred in rooms which had been occupied by the first series of reservists, and a similar fact was noted in regard to the second series, though, in this instance, cases had occurred in the rooms before the period of training was finished as well as at a later date. All the patients at Evreux were men on the active list, but no less than eight reservists developed the disease after their return home. In addition, however, to this, meningitis appeared in the families of four others who themselves remained in perfect health. Two of these proved to be "carriers" of meningococci; the other two were apparently not examined. In one case the "carrier" was responsible for five cases in two different houses which he successively occupied. Netter also records several cases apparently due to "carriers." He himself transmitted the disease to his own son in this way, and considers that he picked up the contagion while passing some time in an overcrowded room from which he removed a meningitis patient. It is satisfactory to know that the child so infected made a good recovery under serum treatment.

Both these papers, then, emphasise the risk of direct and indirect infection—a point we are, perhaps, a little likely to lose sight of when

we consider how difficult it is in large towns to trace any connection between widely scattered cases. The Evreux outbreak is particularly instructive, as it shows how readily the disease may be disseminated by "carriers" over a wide area. The *measures of prophylaxis* adopted by Vaillard are, therefore, of considerable interest, and to them must be attributed the fact that the number of cases which occurred in barracks was limited to nineteen. They consisted, first, of the isolation of the patient himself; secondly, of the quarantine for a fortnight in hospital of the men occupying the two next beds; thirdly, the observation and isolation either in barracks or at some suitable place of all men from the same room, and of the personal friends of the patient; fourthly, the bacteriological examination of both groups and the isolation of any "carriers" found among them; fifthly, the bacteriological examination of the throat and nose of convalescents before discharge; and, lastly, the thorough disinfection of rooms and personal clothing. These elaborate precautions necessitated the segregation of 372 dragoons, 32 of whom were *voisins de lit* and the remainder men from the infected rooms. The differentiation between these groups was amply justified by the bacteriological findings, no less than 38 per cent. of the first being found to be "carriers," as against only 17·6 per cent. of the second. It is interesting to note that only one of these numerous "carriers" developed meningitis, which shows how comparatively harmless the meningococcus must be to many people. Vaillard suggests that infection or immunity may depend to some extent on the condition of the cribriform plate, the passages through which tend to become obliterated as age advances, but might well, in certain individuals, remain open. But there is a great deal to be said against such a theory, which is certainly not supported by the distribution of the meningeal lesions as seen in early cases.

Netter agrees with the dictum of Lingelsheim and others that for every meningitis patient there are about ten healthy "carriers" of the meningococcus. These, however, are most likely to be found in overcrowded and small dwellings, and it is this increase in the opportunities for infection which probably accounts for the fact that multiple cases of the disease are much more frequently met with in the houses of the poor than in those of persons living in easy circumstances. On the other hand, in well-ventilated wards in hospitals the transmission of germs is less and the number of "carriers" is consequently smaller. Out of eighteen internes and patients in his wards, Netter found meningococci present in the naso-pharynx of only two. The proportion, however, of carriers among contacts living in poor circumstances was as high as 38 per cent.—a figure which agrees closely with that of Vaillard for the *voisins de lit* of his infected troopers. It may be remarked in passing that the sanitation and ventilation of

French barrack-rooms must surely leave much to be desired. As regards the length of time the diplococcus is harboured by the "carrier," it is satisfactory to know that in most cases it is short. The longest period given by Netter is fifty days; Vaillard found that sixty-four out of seventy-two carriers were germ-free in one month. It must be recollected, however, that the naso-pharynx of these cases was subjected to daily douching with antiseptics.

In both outbreaks antimeningococcic serum was employed as a method of *treatment*, with striking success. The serum used for the patients at Evreux was that prepared by Dopter at the Pasteur Institute. In all, forty-eight cases occurred, and of these twenty-four had the advantage of serum treatment. Of these, only four or 16·6 percent. succumbed. It is, of course, obvious that a barrack epidemic is favourable to the successful use of serum, as the patients come under competent observation at once, and the injections are, therefore, practised early. Of the soldiers treated, Vaillard reports that only one was injected for the first time as late as the third day—a period which, in civil hospitals, we are apt to regard as reasonably early. The injections were in every case given into the spinal canal. In particularly severe cases, especially those with numerous petechiæ, subcutaneous administration was also employed, and Vaillard appears to consider that this method gives satisfactory results. This is contrary to the opinion of those who have used Flexner's serum, which is apparently of little use unless injected intradurally, and our experience at the Edinburgh City Hospital has been that none of the serums at present available are effective when merely introduced under the skin. Still, it is just possible that Dopter's preparation may form an exception to this rule. That it is a very efficient serum for spinal injections is proved by Vaillard's figures. With its death-rate of 16·6 per cent. is compared the mortality of twenty-four untreated cases, which reached no less than 66·6 per cent. Nevertheless, good as these results are, Netter, who has employed both, prefers to it the serum of Flexner, which in his hands was more successful than any of the other serums used, only 19 per cent. of thirty-one cases terminating fatally. At the same time, the death-rate of patients not treated with serum was as high as 82 per cent.

The advantages of early administration are also demonstrated by Netter's figures. Of sixteen patients injected within three days of the onset, only one died—a percentage of 5·5—a result truly astonishing. The absence of severe sequelæ among convalescents is another interesting feature, only 2 per cent. manifesting any complication, as against 23 per cent. of those untreated with serum. This point has been noted by all the observers who have used Flexner's serum, and it is satisfactory to obtain this confirmation from Netter. As regards administration, the plan of injecting daily for several days, even should

there be immediate improvement in the patient's condition, appears to have been adopted.

Rimbaud (*Gazette des Hopitaux*, 24th June 1909) draws attention to the occurrence of *epistaxis in cerebro-spinal meningitis*. In a small outbreak of twelve cases severe hæmorrhage from the nose was noted in four. This certainly seems a very high proportion. During the Edinburgh outbreak epistaxis was distinctly rare. The most interesting feature of the cases was that all the patients who presented this complication made a good recovery. All were seriously ill and suffered from intense headache and violent delirium. In all the epistaxis was followed by marked improvement. The hæmorrhages were copious. One of the patients, whose case is detailed, lost blood estimated at a litre in amount. Of the eight cases which were not complicated with epistaxis, three terminated fatally. Rimbaud suggests that just as the meningococcus is supposed to penetrate from the nose to the base of the brain, so blood from the meningeal vessels may escape through the arteries traversing the ethmoid, and, by assisting in securing a local depletion, improve the condition of the patient. Be that as it may, we may assume that epistaxis, occurring in the course of a meningitis, is to be regarded as, on the whole, a favourable omen.

NEW BOOKS AND NEW EDITIONS.

Semmelweiss: His Life and Doctrine. A Chapter in the History of Medicine. By Sir WILLIAM J. SINCLAIR, M.A., M.D., Professor of Obstetrics and Gynæcology in the University of Manchester. Manchester: At the University Press. 1909. Price, 7s. 6d. nett.

IT is remarkable that hitherto we have had in English no comprehensive account of Semmelweiss's life and great work, with the exception of a short but accurate and appreciative pamphlet by Dr. Duka. Professor Sinclair has removed this reproach in the present monograph, and done so in the most admirable manner. He possesses all the necessary qualifications for such a task—precise knowledge, enthusiasm, a vigorous clear style, and no hesitation in laying blame on the right shoulders. The present work will take a high place in medical biography.

Semmelweiss was born at Buda in 1818 of well-to-do parents, and was a Hungarian by descent. After study at Pesth and Vienna, he began his life work in one of the great obstetric Kliniks of the Vienna allgemeines Krankenhaus. He did so at a most important epoch of its history. Boer, a follower of British methods, had been ousted from a position he had held with high credit, for a reason that will now appear strange to all, viz. for refusing to teach operative midwifery on the cadaver, and Klein, the incarnation of bigoted officialism, took his place. As to Klein's teaching we need mention only one fact—"he weakly consented to teach midwifery, even to midwives, by demonstrations on the cadaver instead of the phantom"[1] (p. 14). The puerperal mortality at once rose from 0·84 per cent. in 1822 under Boer, to 7·8 per cent. in Klein's first year. Semmelweiss was an enthusiastic pathologist, and this mortality appalled him. From his sensitive and honest nature he deeply felt the loss of life, and determined to get at its cause. The picture given of the routine treatment of the lying-in women at that time appals us now. Frequent examination of the parturients by hands fresh from septic or non-septic post-mortems, were made early in the morning, and might be repeated, in delayed cases, at midday and in the evening. No wonder that Semmelweiss could predict death to any primipara, however strong and healthy, if her first stage were prolonged unduly.

In the Midwives' Klinik, where no students attended, the mortality was much lower, and this was a great directing fact. Semmelweiss

[1] Operative courses were still given to graduates in Vienna on the cadaver in 1877 by the obstetric assistant, and when no eviscerated body was available, "Kein cadaver, kein Curs," was chalked on the board. On one occasion an excited student, feeling he was not getting worth for his money, rushed forward and wrote up below this, "Wir haben sieben Stunden verloren; sieben Stunden, zwanzig Gulden." All antiseptic precautions were, of course, taken, and the cadavera were presumably not from septic cases.

collected and collated the labour results in both those Kliniks most carefully, and demonstrated the excessive mortality in all its relations. He noted all the facts he could—the comparative immunity from sepsis of the "Gassengeburten," *i.e.* of women delivered on the way to hospital and therefore not subjected to examination: the curious occurrence of septic cases, sometimes in a series of women lying side by side, sometimes in irregular succession. All causes of this were considered—epidemic, mental, postural during delivery and so on—but all explanations based on these were answered by the fact of the comparative immunity from sepsis in the Midwives' Klinik and in Vienna itself. It would take too long to give all the curious facts mentioned, the puerperal Geruch (odour) of the wards, and again the Abort (closet) Geruch! That must be read in Sinclair's vivid description.

One may wonder how the real cause was not discovered. The main reason was the pathological teaching. What are we to think of such teaching as that of the well-known Scanzoni, a bitter opponent of Semmelweissism? "The condition *sine quâ non* is the fibrinous crasis of the blood, which, when it rises to a high degree, represents the immediate cause of the disease, and consequently the essential element in the ordinary puerperal fever. It originates under influences of a cosmic telluric character. By no means is the wound of the uterus, represented by the placental site, the real cause and origin of the puerperal fever" (p. 90). Semmelweiss was imaginative and prophetic in his temperament, and the final inspiration came to him from a sidelight, as it were. Kolletschka, a colleague of his, and Professor of Medical Jurisprudence, received a finger infection from an accidental wound during a post-mortem examination, and died as a septic puerpera may die, with peritonitis, pleurisy, and, finally, double panophthalmitis. This would not have inspired the official intellect, but to Semmelweiss it suggested at once that the uncleansed hand of the student in attendance on a lying-in woman after a post-mortem, was the real cause of the terrible mortality in the Klinik. All facts fell into line with this view, and when hand disinfection was employed the explanation was clinched by the fall in the mortality. Semmelweiss vehemently urged his views; Skoda, Rokitansky and other eminent colleagues supported him, and the result was—loss of his position in Vienna, relegation to Buda-Pesth, apathy on his part after a time, neglect of his work, and, finally, his death in a lunatic asylum in 1865, the immediate cause, curiously enough, being sepsis from a finger infection. So died a great benefactor of womankind.

It would take too long to mention the many interesting facts brought out in this work. The black list of opponents to Semmelweiss is striking. Klein is, of course, there, Scanzoni, Kiwisch, Carl Braun, Dubois, even Litzmann and Virchow, alas! are in it too. It is sad reading. Our own country comes out favourably, as Routh, J. Y.

Simpson, and many others received and spread the doctrine, but the general opposition abroad is not understandable.

A summary as to the forerunners and contemporaries of Semmelweiss in civilised countries, of their methods of midwifery instruction, and the reception they gave—a very varied one indeed—to Semmelweiss's views, forms a valuable part of this work. The concluding chapter gives the modern bacteriological work, the analysis, as it were, of Semmelweiss's cadaveric poison.

Semmelweiss's life is really a tragedy, and follows its laws. The hero, Semmelweiss, has an untimely end, as the hero in tragedy must have. Villainy is represented by the University and Hospital official school, who triumph at first, only to be pilloried for all time, a worse fate than Iago's. Semmelweiss's virtues were his sympathy, and self-sacrifice; he had genius, but was no diplomat, and a mere child in the hands of officials with family and Court influence. His faults were his impulsiveness, the way he ultimately alienated some of his friends, and his neglect to publish his facts early enough. They were the defects of his temperament, but a cooler man would not have done so much. We may well say, "Who can control his fate?"

It is interesting to note Semmelweiss's method of work. He had keen sympathy with the untimely deaths from puerperal sepsis, genius and patience in the collection of facts, and then, finally, that imagination which a sidelight inspires. Kolletschka's death gave this. So with Darwin and Wallace. Both, when full of facts and anxious for light on the origin of species, got it from Malthus's theory when far apart—the one in England, the other in Ternate. We may regard Pasteur's influence on Lister in the same way.

The whole narrative goes with a swing and clearly; the thread of description and argument is never lost. It is a book all obstetricians and research-men should read. They will profit by its study. As for the descendants of the official school, nothing touches them but self-interest, and there is nothing of that in Semmelweiss's life.

The "Nauheim" Treatment of Diseases of the Heart and Circulation. By Leslie Thorne Thorne, M.D., B.S., M.R.C.S., L.R.C.P. Third Edition. Pp. 82. London: Baillière, Tindall & Cox. 1909.

This little book contains four chapters, an introduction, and fifty-eight illustrations. We are first told how to give the baths, and something of their mode of action; the "Schott" exercises are described: Chapter III. is on the Selection of Cases Suitable for Treatment, and in the remaining chapter the author gives examples of illustrative cases. The book does not constitute any very valuable addition to our knowledge of the treatment of disease of the heart and circulation.

Graphic Methods in Heart Disease. By JOHN HAY, M.D., M.R.C.P., Assistant-Physician, Liverpool Royal Infirmary. With an Introduction by JAMES MACKENZIE, M.D., M.R.C.P. Pp. 184. London: Henry Frowde, and Hodder & Stoughton. 1909. Price 7s. 6d.

THE importance of the accurate clinical study of the circulation by means of graphic methods is now widely recognised, and the investigation of the heart by such methods is slowly but surely becoming an almost essential part of the routine examination of the circulatory system in every case where there is any doubt as to the functional efficiency of the cardiac organ. The epochal researches of Gaskell, of Mackenzie and of Wenckebach have enabled us within recent years to study and to understand many of the most complex problems in the pathology of the circulation in a manner that was formerly impossible. By taking simultaneous tracings from the jugular vein and from the radial artery or the apex-beat of the heart, we can now obtain with considerable facility very satisfactory records of the movements of the different chambers of the heart. The difficulty arises when we proceed to analyse and interpret the tracings. It is true that the methods of analysis have been carefully described, not only in a number of papers that have appeared recently in the medical journals, but also in Mackenzie's work on *Diseases of the Heart.* Yet the want of some small book which describes how graphic records may be obtained and analysed has been acutely felt by all those who were commencing to study the affections of the heart by these modern methods. The book written by Dr. Hay is an admirable guide to the whole subject. The author's original investigations in this particular sphere of internal medicine are so well known that we turn to his book in the sure and certain hope of finding a logical, succinct and lucid exposition of the subject.

The work opens with a consideration of some of the more important anatomical facts and physiological principles regarding the heart's structure and mode of action which it is important for the clinician to bear in mind. The instruments and methods that can be employed at the bedside for recording the movements of the heart and the pulsations of the arteries and veins are then described, and the author thereafter shows how the records can be analysed and interpreted. Special stress is, of course, laid upon the analysis of the tracings taken from the jugular pulse. The difficult subject of the extra-systole is next considered. Adopting Mackenzie's classification of the varieties of extra-systole, the author speaks of auricular, ventricular or infra-nodal, and nodal extra-systoles.

The subject of "the nodal rhythm" is then fully discussed, and it is shown that in this condition, where the cardiac arrhythmia is usually

persistent and continuous, and where there is no regularity in the disorderly rhythm, the auricles contract simultaneously with the ventricles, both the auricles and ventricles contracting in response to a stimulus which probably arises in the auriculo-ventricular node described by Tawara. The following chapter deals with the functional disturbances of the heart's action—the disorders of conductivity, excitability, contractility, stimulus production and tonicity. The text is well illustrated with numerous excellent graphic records. In their interpretation and description the author very wisely gives the explanations which appear to him to be the most reasonable. Controversial theories are always touched upon as lightly as possible. While the work is, therefore, essentially a handbook, it is in reality more than that, for it is not only a work of great practical utility, but is one of the most valuable of recent additions to the literature on diseases of the heart.

The Principles of Clinical Pathology: a Text-Book for Students and Physicians. By Dr. Ludolf Krehl, Ordinary Professor and Director of the Medical Clinic in Strassburg. Authorised Translation from the Fourth German Edition by A. W. Hewlett, M.D. Second Edition. Pp. 520. London: J. B. Lippincott Co. 1909. Price 21s.

The application of the principles of physiology to clinical medicine is so well presented in Krehl's *Pathologische Physiologie*, and the original shows so clearly how many clinical problems which would otherwise be obscure can be interpreted in the light of well-known physiological facts and principles, that we are pleased to find a second edition of the English translation is now published. The volume deals with much that is of the greatest interest to the physician, the chapters on the Heart, Nutrition and Metabolism, Fever, Immunity, and the Blood being specially worthy of notice. Much new material has been introduced into the sections dealing with the cardiac arrhythmias and with immunity. It is somewhat unfortunate that the text is not always so well up to date, and the reason for this defect in a work which is otherwise most useful and reliable is probably to be found in the fact that while the editor's preface is dated 1907, the work was not published until 1909.

Symptoms and Their Interpretation. By James Mackenzie, M.D. London: Shaw & Sons. 1909. Pp. xx. + 297. Price 7s. 6d. nett.

Those who have been keeping an eye on recent additions to medical knowledge do not hesitate to acknowledge the unique position quietly achieved by the author of this interesting book. By his work on

the pulse, the heart, and certain portions of the nervous system, Dr. Mackenzie has given a new impetus to medical observation, and has shown once more that even in well-harvested fields there is much to glean and gather. Here in small compass we have observations carefully made during a lifetime, and many of them will be found invaluable in diagnosis. After a thoughtful introduction and a classification of the symptoms of disease, pain in its various forms is discussed, especially visceral pain. This is regarded as "referred," that is, it is not felt in the organ but in the peripheral distribution of cerebro-spinal nerves. In the latter part of the work, the association between symptoms and affections of various organs is discussed. The lucidity of the descriptions is conspicuous, and is aided by excellent diagrams and by selected cases. The book is one which every practitioner ought to invest in; it is likely to become a classic.

The Influence of Heredity on Disease, with Special Reference to Tuberculosis, Cancer, and Diseases of the Nervous System. London: Longmans, Green & Co. 1909. Pp. 142 + xii. Price 4s. 6d. nett.

In view of the keen interest which is being taken in heredity, the Royal Society of Medicine held a discussion on the above subject at the end of last year, and they have done well to publish a verbatim account of it. The opinions of twenty men, more or less distinguished in their various lines, are here given, and although it cannot be said that anything has been settled that was previously in dispute, still the need for truly well-directed enquiry is brought home to the medical profession, whose members have the best opportunities for answering many questions here raised.

Rational Immunisation in the Treatment of Pulmonary Tuberculosis. By E. C. Hort, B.A., B.Sc., M.R.C.P.E. Pp. 75. London: John Bale, Sons & Danielsson, Ltd. 1909. Price 3s. 6d.

The volume contains several papers on the therapeutic value of different inoculation methods. The papers are speculative and critical rather than constructive. They include a discussion of the relation of inoculation to other methods of treatment, a consideration of the various methods of inoculation, and a somewhat sweeping statement as to the unreliability of the tuberculo-opsonic index.

The writer seems to have thought a good deal about the subject. Some of the ideas are interesting, but unfortunately their exposition suffers through considerable obscurity of expression and the use of a terminology which probably means more to the writer than to the reader.

On the Poison of Venomous Snakes and the Methods of Preventing Death from Their Bite. Reprinted papers by the late Sir JOSEPH FAYRER, Bart., Sir LAUDER BRUNTON, Bart., and Major LEONARD ROGERS, I.M.S. Pp. 174. London: Macmillan & Co. 1909.

THE nature of this book precludes it from being of much use to the general reader. It will, however, fulfil the praiseworthy purpose which in a short preface one of the authors claims for it, namely, to give a wider circulation to the work of the late Sir Joseph Fayrer, and to render more accessible to future investigators one part of the now enormous literature on snake venoms.

Diseases of the Breast, with Special Reference to Cancer. By WILLIAM L. RODMAN, M.D., LL.D. Pp. 385, with 69 Plates and 42 other Illustrations. London: Sidney Appleton. 1908.

THE surgery of the breast owes much to American surgeons, and we cordially welcome this contribution to the literature of the subject by one whose name has come to be identified with some of the more recent advances. Nearly two-thirds of the volume is devoted to the subject of cancer, and the various problems relating to this most important disease are exhaustively and judicially discussed. With regard to the vexed question of the mode of dissemination of mammary cancer, after a full consideration of the respective claims of the embolic and permeation theories, the author states that he is not prepared to accept the permeation theory of visceral dissemination, although he attaches very considerable importance to the brilliant work of Mr. Handley on this subject. Nor indeed is he "prepared to accept as entirely satisfactory any of the theories of dissemination thus far advanced, for the reason that there are cases in which remote metastases occur which cannot be adequately explained by any of them."

An earnest advocate of extensive operations, the author believes "that surgery should cure one-half of all cases, provided they can be subjected to the complete operation early in the course of the disease." He would extend Volkmann's three-year limit of immunity from recurrence to at least five years before pronouncing the patient cured. Several methods of performing the modern complete operation are fully described, and a series of excellent plates illustrative of the various steps make the descriptions perfectly clear. The same may be said of the plastic resection of the breast after Gailliard Thomas's method, as modified by Warren.

In a supplementary chapter on Paget's Disease of the Nipple, the author argues, and to us seems to prove, that this disease is cancerous from the beginning, and is not merely a precursor of cancer.

In the treatment of acute mastitis we miss any reference to the use of the Klapps suction bell for inducing hyperæmia, a method which has proved of value. The chronic inflammatory affections of the breast, and their relations to general cystic disease, are fully described, and although the author declares that he believes chronic diffuse mastitis with cyst formation, and general cystic disease of the breast, to be one and the same disease, the essential nature of these conditions does not seem to have been made clear. With reference to some important points relating to diffuse hypertrophy of the breast, the author differs from the opinions of Sir George Beatson recently expressed in the pages of this *Journal*.

We can confidently recommend this work by Dr. Rodman as a faithful presentment of the present-day aspects of the surgery of the breast.

Surgical Anæsthesia. By H. Bellamy Gardner, M.R.C.S., L.R.C.P. Pp. 240. London: Baillière, Tindall & Cox. 1909. Price 5s. nett.

This book is evidently the result of many years' thought and experience. The subject is presented from a broad and scientific standpoint, and the language throughout is plain and expressive. The author has formed several strong opinions, which he is not afraid to commit to paper. We note one of these in connection with anæsthesia for abdominal sections in patients who, from some rigidity of the chest-wall, have habitually to rely on the abdominal muscles as part of the respiratory mechanism. In these cases, Mr. Gardner points out, complete relaxation of the recti abdominalis can only be obtained at the expense of passing the line of absolute safety. In such extreme conditions as advanced emphysema, this fact is of course generally recognised, but we doubt whether, in minor degrees of insufficiency of the ordinary muscles of respiration, the importance of the disability from the point of view of the anæsthetist is always taken into account. Those who give anæsthetics for dental surgeons will be interested in the account of the method, which the author perfected in 1906, of combining the administration of nitrous oxide gas, through the nose, with that of oxygen. This must be considered a great advance upon Paterson's original method. The use of ethyl chloride the author has entirely abandoned, believing that the fall of blood-pressure which it causes is dangerously rapid, and the after-effects unduly severe. The account given of the physiological action of chloroform strikes us as rather meagre, and as containing less than the student should be expected to know of this important subject. With this exception, the general plan and scope of the book are excellent, and students and practitioners will find it a safe guide to the principles underlying the right administration of anæsthetics.

An Atlas of Dental Extractions, with Notes on the Causes and Relief of Dental Pain, Designed for the Use of Medical Students and Practitioners. By C. Edward Wallis, M.R.C.S., L.R.C.P., L.D.S., Assistant Dental Surgeon, King's College Hospital, &c. Pp. 26 and Plates. London: J. & A. Churchill, 7 Great Marlborough Street. 1909. 3s. 6d. nett.

It is somewhat difficult for one trained in the methods of the Edinburgh School to review a work on the extraction of teeth by the exponent of another school. The teaching and practice here are so heterodox that a book such as this, which is orthodox from cover to cover, can only be an exposition of how not to proceed. The Atlas is admittedly published for the guidance of the general medical practitioner, and there is a preliminary chapter on the Causes and Relief of Dental Pain, on Local Anæsthesia in Dental Practice, and on the Treatment of Hæmorrhage and Post-Operative Pain. Making all allowance for the orthodoxy of the teaching, there are some statements open to question—*e.g.* that five is the minimum number of forceps for any ordinary extraction; that the bicuspids erupt between the roots of the temporary molars; the line of demarcation assumed to exist between the mucous membrane and periosteum of the palate; and the recommendation to stop hæmorrhage by holding very hot water in the mouth.

The illustrations of teeth are very poor, and the number of plates might have been very much reduced by not repeating the photographs, one of which occurs five times and very many others three times.

Golden Rules of Dental Surgery. By Chas. W. Glassington, M.R.C.S., L.D.S.Edin., Lecturer on Dental Materia Medica and Therapeutics (late Dental Surgeon) to the National Dental Hospital and College, &c. "Golden Rules" Series, No. xiii. Third Edition. Pp. 72. Bristol: John Wright & Sons, Ltd. London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd. 1909. 1s.

This little book, which has already proved its worth by reaching a third edition, is brimful of good advice and sound teaching. Since another edition is certain to be called for, we would suggest one or two improvements. Thus "dead tooth" is loosely used for "dead pulp," and, page 33, very few would support the advice to extract the first permanent molars. Again, ethyl chloride produces a better anæsthesia in children than $N_2O + O$, which the author recommends; and, finally, would it not be better to say what Condy's fluid is than what it is not? Such blemishes, however, seem only to throw into sharper relief the excellence of the book as a whole, and we confidently recommend it to our readers.

The Bacteriology of the Eye. By Professor AXENFELD of Freiburg. Translated by ANGUS MACNAB, F.R.C.S.(Eng.). London: Baillière, Tindall & Cox. 1908.

THIS book is one of the most valuable contributions that have been made to ophthalmology for some years, and English readers are under a great obligation to the translator for placing such an important work before them in their own tongue. We have read the book most carefully from beginning to end, and have no adverse criticism to offer, but simply unbounded praise. It is not a work that should be relegated to the book-shelf when read, but should lie on the laboratory table beside the microscope for constant reference, for it bears the same relation to the ophthalmic bacteriologist as "Ellis" or "Cunningham" does to the anatomical student at the dissecting table.

Since the work appeared in German in 1907, Professor Axenfeld has extended parts of the text, so that the present issue may be regarded as a second edition, the proof sheets having been revised by the author himself.

The work consists of eleven chapters, with introduction and index, and covers the whole ground in an admirable manner. It is interesting to observe that it is dedicated to Morax, the distinguished Parisian ophthalmic bacteriologist, who has frequently in conjunction with the author done such excellent work in ophthalmic bacteriology.

Chapter I. deals with technique, such as staining, preparation of culture media, inoculation into the eyes of animals, &c., the information given being clear and to the point.

The normal conjunctiva and lids are dealt with in Chapters II. and III. in a most interesting and instructive manner. The flora of the normal conjunctiva, we are told, is very variable, there being no constant inhabitants. The number of micro-organisms increases under a bandage, because the lids are kept still and the temperature thereby becomes increased. The number varies in the same individual at different times of the day, while the absence of blinking, it is stated, prevents the passage of bacteria into the nose. Of the pyogenic micro-organisms met with, the pneumococcus is relatively the most common. It is gratifying to know that, in the majority of cases, the normal conjunctiva contains no virulent pyogenic micro-organisms, that the tears form a bad medium for growth, and that the number of micro-organisms is continuously being lessened by the constant flow of sterile tears through the lachrymal sac into the nose; but in the absence of winking there is no transmission into the nose.

The subject of wound infection is discussed in thirty pages, and is worthy of the most careful perusal, containing, as it does, many valuable suggestions as well as well-known and established facts. The bactericidal action of the tears plays a very small part in the auto-

sterilisation of the conjunctiva. "Post-operative conjunctivitis" is certainly less common, we are told, with the open treatment and thorough asepsis, while antiseptic compresses laid on the lids have very little influence on the presence of pyogenic micro-organisms. This is a strong argument for treating all wounds *aseptically* and not *antiseptically* by antiseptic lotions and dressings impregnated with antiseptics. Another point of the utmost importance to the operator is, that wounds, as shown by experiments on rabbits' eyes, made with septic instruments practically always suppurate, but when virulent cultures of "aureus" were dropped into the conjunctival *cul-de-sac* of rabbits and then the section made with sterilised instruments, only 20 per cent. became infected.

The conjunctiva, like all mucous surfaces, cannot be made absolutely sterile without damaging it by the very means employed. Further, we are told (it is an old tale now) that the usual antiseptics have no advantage over a simple saline solution.

The pneumococcus is by far the most important micro-organism in post-operative infection of the globe, and in tear duct obstruction the lachrymal sac affords conditions most favourable for the growth and increase of the virulence of micro-organisms, especially the pneumococcus. It is gratifying to note that under no circumstances can the pneumococcus pass upwards from the nose through the healthy tear duct, neither can it pass when there is a permeable stricture. Healthy lids are not dangerous, but when blepharitis supervenes the lids become a very fertile means of infection. Conjunctivitis and special forms of conjunctival infection together with lachrymal affections, are discussed in Chapters V., VI. and VII., while corneal lesions, leprosy, tuberculosis and syphilis of the eyes, endogenous infection and orbital inflammation are all fully treated in the remaining chapters.

We very heartily recommend this most valuable work to everyone who wishes to become acquainted with the latest information regarding the bacteriology of the eye, and to all operators, for they will find in it valuable suggestions which are bound to have far-reaching importance on their work.

It is, in short, a *magnum opus*.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES AND NEWS.

The G. M. C. and Education.

For three or four sessions the General Medical Council has had a report of the Educational Committee dangling before it. Again and again this has had to be postponed for future consideration, and at last session it was arranged that it should be taken as the first business on this occasion. The time has not been altogether lost, for over a year ago it was agreed to send the report *simpliciter* to the various licensing bodies for their consideration and comment, and it is an interesting fact that none of them took any serious objections to its proposals.

Before saying anything further, it will perhaps be as well to state exactly the final finding of the Council on the matter.

It is this :—The Council agreed to recommend to the various licensing authorities that they should so frame their regulations that a period of two years should elapse between the passing of the examination in Anatomy and Physiology and the Final Examination. This was not exactly the form in which the committee's recommendation originally stood ; in some respects it goes further and in others not so far, but it was accepted as the form approved by the majority of the Council.

In our opinion it is a forward step of considerable importance. Everyone connected with medical education know how students who have not made the best use of their earlier years may by hard grinding acquire a sufficient knowledge to convey to their examiner the impression that they have a sufficient knowledge of their subjects. Undesirable as this crammed knowledge always is, there are, we think, no two opinions that it is most undesirable in connection with the Final Examination, and in future it may, we feel satisfied, be made certain that at least two years will be spent on the study of pathology, therapeutics, medicine, surgery, midwifery, medical jurisprudence and public health, and their lesser branches without any examination in the earlier subjects to compete for the student's attention.

It will not in any way interfere with the career of the good, or even the average, student who passes that examination now two years and a half before his final, but it does ensure that the student who does not

pass his "second" at the normal time shall not be able even to attempt to pass his final along with the men who passed at the proper time.

It so happens that by the accident of date we are the first medical journal to make this announcement, and there is one further point which should be understood from the first, viz. that two years means two *whole* years, and there is to be none of that unfortunate discount of three months which, in our opinion, was so unfortunate a concession in the five years' curriculum.

Much credit is due to Principal Mackay, the Chairman of the Education Committee, who not only gave unstinted time and care to the preparation of the report, but showed much statesmanlike skill in piloting it through some rather dangerous rocky shoals.

The Administration of Anæsthetics.

At its May Session the General Medical Council appointed a Committee to consider the proposal for legislation on the subject of anæsthetics which had been or might be thereafter put forward, with instructions to report to the Council on the subject at the July Session.

We referred in our July number to a Bill which had been before Parliament and had been withdrawn. That Bill proposed to make it illegal for any one but a registered medical practitioner to administer anæsthetics. It also contained a clause imposing a penalty for giving a death certificate in the case of a person dying under an anæsthetic.

The Anæsthetic Committee of the Council had before them the text of a second Bill introduced into the House of Commons in June, and which had been substituted for the Bill we referred to. The object of the Bill was to require a medical practitioner or a dentist applying for registration on or after January 1, 1912, to submit evidence of having received practical instruction in the administration of anæsthetics, and to prohibit any person not a registered medical practitioner or a registered dentist administering an anæsthetic except under certain conditions; to prohibit any certificate of death being given in the case of any person dying under an anæsthetic.

The Committee, after consideration of the Bill, came to certain conclusions which were submitted to and unanimously approved of by the Council on the last day of the November Session, together with the recommendation that they should be transmitted to the Lord President of the Privy Council for his information.

These conclusions contain most valuable and practical suggestions, and may be summarised as follows—

The Council consider that its statutory powers are sufficient to secure that candidates for medical and dental qualifications shall have received adequate practical instruction in the administration of anæsthetics, and that it is inexpedient to provide by Act of Parliament, as proposed in the Bill, that evidence of such instruction should be

raised to the status of an "additional qualification," without which no person shall be entitled to registration; and further, that the Council is enabled to take account from time to time of the advances of medical science in regard to the methods of procuring anæsthesia, and to vary its *Recommendations* in a manner which would not be practicable under the terms of the proposed Bill should that pass into law.

The Council considers that, due provision being made for the practical instruction of students—medical and dental—and for cases of emergency, that it is desirable that the administration of anæsthetics for the purpose of inducing unconsciousness or insensibility to pain during medical, surgical, obstetrical and dental operations or procedures should be restricted by law to duly qualified medical practitioners; that it is also desirable that duly qualified dental practitioners should be authorised to administer certain specified anæsthetics such as nitrous oxide for the purpose of inducing unconsciousness or insensibility to pain during dental operations or procedures.

It is suggested that the specification of the anæsthetic substances or drugs which may be employed by duly qualified dentists should be made in a schedule to the proposed Act of Parliament, power being reserved to the Privy Council on the Recommendation of the General Medical Council, as the authority charged with the publication of the to *British Pharmacopœia*, to add to or vary the specified list from time to time as occasion arises.

It is further suggested that, due provision being made for cases of emergency, the person who administers the anæsthetic for the purpose of inducing unconsciousness during any medical, surgical or dental procedure should not be the person who performs the said operation or procedure.

With regard to Clause 7 of the Bill, to which we have already referred, the Council holds that it is inexpedient to create, as proposed, a new penal offence, the precise nature of which is not defined, inasmuch as the words "dying while under the influence of an anæsthetic" are capable of several interpretations varying with the circumstances in each particular case. If it should be deemed desirable to make provision for duly recording such cases, a system of notification to the proper authorities, similar to that which is applicable to births, or to infectious diseases, would be sufficient for the purpose.

Lastly, it was agreed to add to the Council's Recommendation on Dental Education and Examination, "Administration of the Anæsthetics usually employed in Dental Practice."

Among the penal cases was one brought to the notice of the Council by the Home Office in which lamentable laxity had been shown in the

matter of official certificates. Only a year ago we referred to a somewhat similar case brought to the notice of the Council by the school authorities of Birmingham. In both cases the Council felt it its duty to direct the erasure of the name of the accused practitioner from the register, and we cannot too strongly urge on the profession the importance of the most scrupulous accuracy and care in filling up documents to which they attach their professional signatures. These certificates are evidence in the Law Courts, and they must be above suspicion.

Chloroform and Hospitals.

In another column we publish a report of an inquest held by the Coroner for the City of London upon the body of a man who died at St. Bartholomew's Hospital while under the influence of chloroform. The case itself presents no special point of interest, but a question raised by the expert witnesses, and commented upon by the Coroner, calls for some remarks. It is the relative safety of chloroform as made from ethylic alcohol, methylated spirit, and acetone. The first-named source involves the payment of the full duty upon a potable spirit. It was calculated in 1905 that the extra cost incurred by the use of chloroform so prepared, rather than the cheaper brands, would, in the case of Guy's Hospital, amount to £200 annually. Under the present Budget that sum would be considerably exceeded.

That a perfectly pure drug can be prepared from any of the three sources appears to us to be conclusively proved. On the chemical side we have the experience of the laboratory of the Royal Infirmary, where, we understand, no accidental impurity has been detected in samples prepared from any source within the last forty years; while, clinically, we have the evidence not only of the three best known text-books (Hewitt, Luke, and Buxton), but also the general experience of most surgeons and anæsthetists, that no difference in the action of the various brands can be observed.

At the inquest the expert evidence was in direct contradiction to this generally held belief. Should definite evidence of the superiority of chloroform made from dutiable spirit be available, we trust it will be forthcoming. Until then, we see no reason why public hospitals should be expected to provide the Chancellor of the Exchequer with a larger amount than, in the present state of the law, they are, unfortunately, obliged to contribute.

Dermatology in Glasgow.

The Glasgow Hospital for Skin Diseases was founded in 1861 by Drs. A. B. Buchanan and M'Call Anderson. Buchanan died young, and M'Call Anderson and the Glasgow Skin Hospital became synonymous terms. There he laboured long and diligently, and there he laid the foundation of his

world-wide reputation. Later, when Anderson became Professor of Clinical Medicine, the importance of a knowledge of dermatology was impressed on the Glasgow students, and they attended the Skin Hospital for the regular summer course.

When the Western Infirmary was built, arrangements were come to by which, in consideration of a handsome donation, the directors of the Western agreed to equip and maintain two wards for the treatment of skin cases, and Anderson was placed in charge of these wards in addition to the medical ones he held as Professor of Clinical Medicine. The out-patient department was continued on the old lines.

On M'Call Anderson's death the directors of the two hospitals wisely decided to reconsider the whole question. There were many difficulties to overcome, but eventually an agreement was reached and incorporated in a Parliamentary Order which received the Royal assent on 16th August last. Under its provisions the whole work of the old Skin Hospital is transferred to the Western Infirmary, the skin wards there are to be named in memory of the founders of the Skin Hospital —the A. B. Buchanan and the M'Call Anderson wards—and out of the accumulated funds of the hospital is to be established and endowed a University Lectureship, to be called the "M'Call Anderson Memorial Lectureship in Dermatology." Thus Glasgow, although the last of the Scottish Universities to appoint an official lecturer on dermatology, is the first to provide by endowment for his support!

Dr. Wyllie Nicol, who was for several years assistant-physician to the Skin Hospital under M'Call Anderson, has been placed in charge, with Dr. Tomkinson as dispensary or assistant-physician.

Special hospitals have their uses, and were very necessary in those days when the physician and surgeon of the hospitals jealously refused all recognition of the specialties. But wiser views now prevail, and well-equipped special departments are now recognised as a necessary part of every modern teaching hospital. The closer association of the general physicians and surgeons with the specialists has done much for medicine generally, and not a little to broaden the views of all its teachers.

The Naval Medical Service.

THE reorganisation of the Navy as a fighting force for the purpose of concentrated action in the North Sea has not improved the lot of the naval medical officer. Instead of the glorified yachting life of former years, with an attractive amount of sight-seeing abroad and useful spells at home stations for months at a time, the surgeon in the Home Fleet under present conditions spends about nine months of the year in the North Sea, with no Service duties and under conditions which render serious reading or writing difficult or impossible. It would appear, therefore, that the greater the efficiency of the Navy as a fighting

force, the less desirable is the life of the naval surgeon. We are unable to discuss the question on a Service basis, and we are sure that no one in authority in our medical schools will ever dissuade those who come under his influence from entering the Medical Service of the Navy on account of conditions which are necessary for its efficiency. There are, however, a number of grievances which arise out of conditions which have nothing to do with the efficiency of the Navy. Some of them, to those ignorant of the conditions on board a man-of-war, appear unimportant, but still they are made the subject of complaint, and they may partly account for the comparative unpopularity of the service, judging from the fact that graduates of ability and qualifications above the average do not consider the Navy a desirable career.

We do not pretend to have studied the grievances of naval surgeons, but we can hardly be teachers in a large medical school without hearing of them.

It is alleged that the cabin provided for the surgeon is not all that it might be; that, considering it is the only place on board wherein he can have privacy and quiet, it is most inadequate for purposes of study. That in a matter of authority even an Inspector-General has no powers over the sick berth staff, and in the way of salute is not even entitled to the same consideration as a junior lieutenant. That in the matter of allowances the Naval Medical Service compares very unfavourably with that of the Home or the Indian Army. That the opportunities and facilities for getting on shore are such as cause great discontent, and the resulting irritation seems to be the more keenly felt because the causes of complaint might be so easily rectified.

Among recent appointments we have to chronicle that of Dr. Wyllie Nicol, M'Call Anderson Lecturer in Dermatology, Glasgow University; of Mr. W. J. Stuart, Visiting Surgeon to the Deaconess Hospital in place of Mr. Alexis Thomson, who has been made Consulting Surgeon; of Mr. Henry Wade, Assistant-Surgeon to the Royal Infirmary; and of Dr. James Miller, Assistant-Pathologist to the Royal Infirmary.

We cordially approve of the resolution of the Medico-Chirurgical Society to recognise, in the form of a presentation, the long and valuable services which Dr. Craig has rendered to the Society. For twenty-eight years he has edited the *Transactions* in such a manner as not only to give universal satisfaction to the members, but which has tended in no small degree to improve the financial position of the Society, and to add to its popularity in medical circles in Edinburgh.

THE INFLUENCE OF THE TISSUES OF THE BODY ON THE INCIDENCE AND THE TREATMENT OF DISEASE.

By JAMES RITCHIE, M.D., F.R.C.P., F.R.C.S.[1]

It is difficult to realise that two years have elapsed since you did me the great honour of electing me to this chair. These years have literally fled, but in that time the Society has accomplished much useful work. The attendance at our meetings, which for some years has been on the increase, has continued to grow—an evidence that the contributions of our members have been appreciated. Those who have been most regular in their attendance have obtained the greatest reward. The privilege of asking questions regarding patients exhibited has been esteemed, and as it has not interfered to any appreciable extent with the other work of the Society, the Council has decided to continue the practice for another year. The clinical meetings have been distinguished by the wealth of material exhibited, and the large attendances at them give testimony that they are valued. I take this opportunity of acknowledging my indebtedness to the senior Secretary—Mr. David Wallace—for the valuable assistance which he has at all times given me personally, and for the able and efficient manner in which he has arranged for the business of the Society, because it is on the senior secretary that this work chiefly falls, and it involves at times a considerable amount of work. Mr. Wallace, as you know, thinks that the time has come for allowing the honourable position to pass on to another, and we welcome Dr. Darby Boyd, his tried and able successor. Another tried and valued veteran official of the Society retires from office this evening—Dr. Wm. Craig—who for 28 years has edited our *Transactions*—who, indeed, in 1881 induced the Society to enter upon a new era, and to publish a volume of *Transactions* every year and to send a copy to each member, and he did this without increasing the amount of the annual subscription. Only those who have done editing work can realise the amount of labour which this long-continued service has involved. When we consider the style of our published volume, its correctness and the invariable punctuality with which it has been delivered to each member

[1] President's Valedictory Address to the Medico-Chirurgical Society, 3rd November 1909.

before our first meeting in November, we may realise in some degree the greatness of our indebtedness to Dr. Craig. This does not measure the debt which the Society owes to him, because during the 28 years he has been in office he has given much practical and wise advice at the meetings of Council. The mention of the Council recalls to mind the fact that the Society owes a large debt of gratitude to it for the time and consideration which it bestows on arrangements for the Society's well-being. The death-roll during the past two years has been a serious one, both as to number and status of our members. It includes three Honorary members, viz. Professor Fr. von Esmarch, Kiel; Dr. Hermann Snellen, Utrecht; and Dr. Argyll Robertson, who had in succession held the offices of Secretary, Vice-President, and President of the Society: one Corresponding member, viz. Professor Sir John Banks: ten Ordinary members, viz. Sir Patrick Heron Watson, who had also held the offices of Secretary, Vice-President, and President; Sir Arthur Mitchell; Professor Annandale, Vice-President; Francis Cadell, Secretary and Vice-President; P. A. Young, Vice-President; C. E. Underhill, Vice-President; W. A. Finlay; Surgeon-Major Black; Charles Kennedy, and Professor D. J. Cunningham: five Non-Resident members, viz. David Brodie, London; C. E. A. Sheaf, Fiji; John Archibald, Bournemouth; W. Wotherspoon Ireland, Musselburgh; and Geo. R. Wilson, Newmains. By the passage of these, some of us have lost valued friends, men whom we esteemed highly; most of them were active workers in the Society—we pay a reverent tribute to their worth. They served their day and generation well, and we think of them as now engaged in a higher service beyond.

In the short space of time at my disposal I propose to direct your attention to the Influence of the Tissues of the Body on the Incidence and the Treatment of Disease.

Scientific Progress Marked by Tendency to Extreme Views.—During the past 30 or 40 years medicine has become more of a science than it formerly was. In some special departments the advance has been great. I desire to make the suggestion in passing that the writers of new books on special subjects should furnish them with a glossary of terms, coined not to puzzle the tyro, but to facilitate the transference of ideas, and to aid in explaining new theories. Many of the theories and working hypotheses of 20 years ago, even of 10 years ago, have been placed in the Museum of Antiquities. Carbolic putty, carbolic plaster, and carbolic spray producers played an important part in

the development of the antiseptic system, which prepared the way for the aseptic system of surgery, but they have long since become obsolete. Doubtless some of the theories and methods of treatment which prevail to-day will before long find places in the same museum. In our eagerness to progress we allow the pendulum of scientific theory, and of practice based on it, to swing too widely to the one side or the other, perhaps because of imperfect knowledge, or it may be because we fail to recognise the importance of modifying influences. When any fresh discovery is made, business houses endeavour to exploit it beyond reasonable limit, and there is the danger that we also may allow it unduly to dominate our ideas and our practice.

Bacteriology.—One of the new departments which has arisen out of the discovery of the influence of micro-organisms in health and disease, viz. bacteriology, has done much to advance our knowledge of vital processes, and has contributed in no small degree to our understanding of the subtle properties of some of the tissues of the body, notably of the blood; it has also increased our ability to prevent disease and to treat it with more success than formerly. The discovery of the causal relation of micro-organisms to a considerable number of diseases has led to a war of extermination of the associated pathological germs, with results, in relation to some of them, which abundantly justify the crusade.

Influence of the Soil.—It is doubtful, however, whether attention has not been too much concentrated on the micro-organism to the neglect of, even to a disbelief in, the important influence of the soil in which they grow—the tissues of the body. This neglect does not take place in laboratory work, because the workers know of how great importance the qualities of the soil are to the successful cultivation of micro-organisms. It seems to me that in relation to diseases, not only those which are directly due to the presence of organisms, but other diseases, the influence of the tissues of the body on the incidence and the treatment of disease is not receiving the attention which it merits. Hilton Fagge, who was an able observer, expressed disbelief in the whole doctrine of temperaments and diatheses, which appeared to him to be the residuum of the exploded physiology of Galen. Things which can be seen and handled tend to make a more profound impression on our mind than those which are unseen. Micro-organisms can be demonstrated, they can be cultivated in the laboratory, and their influence on animal life and health can be

ascertained by the experimental use of them. Are we in practice allowing these to bulk too largely in our mind to the prejudice of the recognition of the importance of the soil in which they grow?

Life depends on an ordered sequence of chemico-vital processes, which are both constructive and disruptive, and the quality of the results of these processes, whether it be digestion, nutrition, excretion, growth, or development, will depend on the quality of the plasm of the tissues, and that quality will determine the power of resistance to morbific influences and also the method, time and rate of decay of the body. These chemico-vital processes will also be affected by the quality and amount of nerve influence which is transmitted to them, and which will modify the amount and quality of the results.

Heredity in Relation to Quality of Tissues.—J. Arthur Thomson, in his work on *Heredity*, says, in regard to the ordered sequence of these processes, that "the organism is from the outset predisposed, let us say 'geared,' to perform these in a certain routine. But the gearings are from the beginning delicately adjusted; a slight initial difference may make a lifelong friction; a slight germinal bias may determine the trend of the whole life." Upon the quality of the germ plasm and of the sperm plasm supplied by the parents will depend the quality of the plasm of the offspring. The quality of the germ and sperm plasm of the parents depends upon the constitution of the parents and upon their condition of health at the time at which these elements were formed. While we may accept Weismann's theory of the continuity of germ plasm, it can only be in a modified form. The germ plasm which, at a very early age of embryonic life, is deposited on the genital ridge goes in the female to form many thousands of potential ova. For the next generation one of these, containing a very small portion of this germ plasm, is fecundated. For nutrition and growth it depends on the mother. The quality of her nutrient material will depend on her constitution and health during pregnancy. Gardeners and florists find that in budding and grafting the scion, although it exhibits chiefly the character of its parent, partakes of the qualities of the stock in colour, coarseness, or fineness, &c., and even the characters of its reproductive organs may be altered. By these methods there is accomplished what is called ennobling. By analogy we are justified in expecting that the quality of the fœtus in the human subject is modified by the health of the mother. Many years ago I attended a tall, well-built anæmic woman who had no

evidence of tubercle. She was a very careful housewife, but rarely went out of doors. Two of her children died in early infancy of tuberculosis. I advised her in her next pregnancy to make it a duty to go out of doors every day. She did her best to carry out the advice during the two next pregnancies. The *post hoc* was two children who were fairly healthy during their childhood. During the succeeding pregnancy she was less careful and the child of that pregnancy was more delicate.

The quality of the sperm cell must also have a potent influence on the new generation, because its influence is not confined to that of exciting cell division in the ovum; there is an intermingling of the germ and sperm elements, including the nuclei and their chromatin, and a redistribution of their substance in a definite manner, as demonstrated by Mendel. The sperm cell, although it is produced by an organ descended from the germ epithelium of the ovum, is not a simple continuation of it, but it is formed from time to time under certain stimuli, and the quality of it depends on the health and condition of the individual at the time at which it is formed. If it is liable to be infected by what Jonathan Hutchinson calls "contaminations," such as alcohol and syphilis, other influences also will affect its quality.

Evidences of Heredity of Tissues in Medical Practice.—Those of us who have been engaged in family practice for a considerable number of years have experience that in certain families the children have few illnesses, whereas in others the children up to a certain age—perhaps 12 or 14—are frequently ill, and if the family be a large one we are not many weeks absent from attendance on one or another member, but there comes a time when good health is enjoyed and we are rarely required to advise. In these families there is a vulnerability in the early years. If the young children were not cared for they would succumb, but because of the tendency of the tissues, up to a certain age, to revert to the healthy type when the conditions of life are favourable, they develop into healthy men and women even before the period of active growth is completed.

In some families there are few ailments until the children go to school, then they take every infectious disease to which they may be exposed; in others the children have little liability to infection. Some families exhibit a great tendency to catarrh of the respiratory tract; in some the catarrh rarely goes further than the nose and throat, in others bronchial catarrh and bronchitis of the larger tubes are common, and in some there is the

tendency, even if care be taken from the outset of the illness, for the catarrh to extend to the bronchioles and air cells of the lungs. In other families it is the digestive organs which suffer—gastric, gastro-duodenal or gastro-intestinal catarrh results whether the cause be dietetic error or chill.

Hermann Weber writes that "Heredity exercises a potent influence on the duration of life." There exists a kind of plasm of which the vital power is exhausted at an early age, therefore nearly all the members of some families die young. Of other families the members are long lived. In some large families there is no break by death, unless by accident, up to a certain age, then about that age all or most of the members succumb. The quality of the transmitted plasm is also exhibited by various family peculiarities, such as the tendency to premature baldness, to cavities, to decay of teeth at a very early age, and it is further noteworthy that the kind of decay of the teeth runs through the members of the same family, it may be of the enamel chiefly, or of the dentine.

The result of consanguineous marriages is interesting in relation to the transmission of qualities of plasm, because in these families if there be any taint it tends to be greatly increased in the progeny. J. Arthur Thomson, in his work on *Heredity*, gives statistics of deafness in illustration of this.

Both parents congenitally deaf produced			25·931	per cent.	of deaf	children.
One parent	„	„	6·538	„	„	„
Both parents adventitiously deaf		„	2·326	„	„	„
One parent	„	„	2·244	„	„	„

The members of small communities of fisher folk in Scotland rarely marry out of their own set; insanity is known to be common in these communities.

Defect is in the Ultimate Cells.—The defect, when defect exists, lies in the ultimate cells, it may be of one tissue or of several. The tissue may be the blood, the erythrocytes, the leucocytes, or the liquor sanguinis. It may be in the secreting cells—nutritional or excretory—their chemico-vital function may be easily perverted. In some families there is a great instability of the nerve cells, their function is easily affected by toxines or by alcohol. These conditions are very common in those descended from alcoholics.

Types of Constitution.—A consideration of these facts shows the wisdom of the advice that "we should be careful in the choice of our ancestors," because of the inheritance which they transmit

to us of tissue with certain qualities and tendencies as to chemico-vital action. There are many combinations and varieties of constitution, but the types usually described are: -(1) *The gouty*, with acid secretions, a tendency to depraved metabolism with imperfect oxidation of waste products, and the deposition of morbid material in tissues with feeble circulation. (2) *The rheumatic*, also with excessively acid secretions, the saliva often acid, a tendency to effusions specially into fibrous tissues, tendency to inflammations of serous membranes. (3) *The nervous*, with easily excitable nerve cells, easily produced nerve explosions, and as the nervous system presides over all the functions of the body the manifestations and changes are very numerous. They may be temporary, as paling and flushing of different parts, or more permanent, as in diseases of joints. (4) *The bilious*, with large capillary development, irregular and often imperfect function of the liver, and the accumulation in the system of products usually transformed and excreted by that organ. (5) *The tubercular* in its two varieties—the pretty and the ugly—with its liability to catarrhs and the tendency to lymphatic and blood changes. Hamilton believed in an inefficiency of protective epithelium in the tubercular, but infection appears to be as common by the blood-stream as by epithelium.

Influence of Quality of Soil on Disease.—It is not to be wondered at if certain qualities of tissue with varieties of character of secretion should be prone to certain kinds of disease and should have the course of disease modified in them. If we turn our attention to the vegetable kingdom we find many evidences of the influence of the soil both as to nutrition and the incidence of disease. Agriculturists and florists know that the quality of the soil is of much importance; it may be unsuitable to certain plants because it contains some element which is injurious to them, or it may be deficient in something which is essential to their growth; it may contain too much or two little moisture, or it may have a quality which they call sourness. The conditions which suit one crop may be unfavourable to another. Certain fungi grow in concentric circles called fairy rings, they extend outwards but cease to grow in the centre because there they have exhausted an element in the soil which is essential to their growth.

Laboratory workers find that many pathological germs grow best in alkaline media; this explains why they do not flourish in the healthy vagina of women, the secretions of which are normally acid. These germs have occasionally been found, but

they do not flourish, and the bearers have not apparently suffered in health. Bumm found staphylococcus aureus and streptococcus in vaginal mucus, Mironow four times found streptococcus pyogenes, and Widal found the latter organism in the vagina of a pregnant woman who was apparently well. But the gonococcus flourishes in an acid medium, therefore it is able to induce a diseased condition in the vagina. For the treatment, therefore, of gonococcal disease, whether in male or female, the indication is to ensure that the fluid bathing the affected part shall be alkaline.

Loeffler's bacillus is occasionally found in the throat, the diplococcus intra-cellularis meningitidis in the nose, and the diplococcus pneumoniæ in the mouth of persons who are apparently well, and it is only after the resistance of the system has been lowered, or when some local change has been induced, which renders the tissues a suitable nidus for the active propagation of the organism and possibly its passage into the general circulation, that the corresponding disease is induced. Fraenkel found the pneumococcus constantly in the blood of pneumonia, Rosenow in 160 of 175 cases, and Prochaski in all of 50 consecutive cases. Those of us also who have suffered from boils in the hand or arm have doubtless been conscious of an itching from time to time in different parts of the limb, with the occasional occurrence of small red points, the most or all of which may have disappeared, but at times one of them has developed into a boil. We conclude that the organism has been in the lymph or in the blood-stream, that it has been arrested here and there, but the condition of the blood or of the other tissues has prevented its development and has caused its removal.

The influence of the soil on the growth of trichophyton tonsurans is exhibited partly by the difficulty of curing the disease in certain constitutions and also by this other fact, that stubborn cases which, before the days of X-ray treatment, had resisted other remedies, recovered rapidly when the child had reached the age of 14.

With regard to the tubercle bacillus, there are many facts which go to prove that the quality of the tissues has much to do with its development. Four members of a tubercular family went to reside in parts of the globe widely apart; at the time of leaving home they all appeared to be well, but all of them died of tubercular disease. Some cases seen early with only a small focus of disease progress to a fatal termination notwithstanding all the care which, with our present knowledge, we are able to bestow. Other

cases with extensive disease recover in a most unexpected manner. The following instance of this kind impressed me greatly, viz. a pregnant lady, with phthisis pulmonalis, when the time of her confinement approached had high fever, large cavities in the apices of the lungs, was emaciated, the throat, cheeks and tongue were covered with aphthæ. She was so seriously ill that it was decided in consultation to try to save the child's life by post-mortem Cæsarean section. Nevertheless she began to improve, went steadily forward without relapse after confinement, and three months later her lungs presented few traces of the former serious condition.

The tissues of some persons in what is their normal condition appear to afford a favourable nidus for the growth of the T.B., whereas the tissues of other persons present a suitable soil only after their vitality has been lowered by exhaustion, catarrh, or injury. We know that tubercle frequently becomes implanted on a neglected bronchial catarrh, and if there is a combination of debility and catarrh such as follows measles there is a greater liability to infection. A small area of tubercle in a lung may remain dormant for a long period and may be rendered demonstrable only after the onset of catarrhal pneumonia has prepared the soil and has led to a rapid extension of the tubercular area. I knew an elderly gentleman who had enjoyed 50 or 60 years of good health, but when his vitality had been lowered by old age he was attacked by bronchitis, then followed a tubercular process in his lungs, with a breaking-down process and the expectoration of small cretaceous masses, the remains of healed tubercle from which he had suffered in early years, but had long since forgotten. A person with enlarged tubercular glands receives an injury to bone or joint and very soon tubercular disease manifests itself in the injured part. My friend, Dr. Scrimgeour, of Nazareth, tells me that the nomadic Bedouin in Palestine rarely suffer from phthisis pulmonalis, but they are very liable to tubercular diseases of bones and joints. I suppose that the explanation is that they have the bacillus in the blood, at least at times, but as they breathe a pure air and are not liable to respiratory catarrh the lungs escape. On the other hand, in consequence of their mode of life these Bedouin are very liable to injury and the T.B. finds a suitable nidus in the tissues of the injured part.

The rheumatic constitution does not present a favourable nidus for the growth of the T.B. Should tubercle develop in a rheumatic person we are justified in giving a more favourable prognosis than we would otherwise give.

The influence of the tissues of certain individuals on the liability to rheumatism is very marked. These persons tend to have the saliva and perspiration acid, and the urine is often more acid than normal. The occurrence of an acute attack is favoured by any condition such as grief, anxiety, or improper diet, which leads to the production of acid indigestion, or by excessive exertion, which increases the acidity of waste products of muscle, or by injury to joints if the treatment of them is neglected.

Immunity an Evidence of Alteration of Quality of Soil.—It has long been known that after certain infections the person acquires a greater or less degree of immunity from them. Immunity means some change in the tissues, and differences in the quality of the soil explain the occurrence of relapses as well as of subsequent attacks of the disease in a few individuals. Advances in bacteriology have enabled us to render persons immune to certain diseases, or to hasten their recovery from them by injections of antitoxines or of definite quantities of killed micro-organisms, and so to modify the soil. The way in which many of the poor, especially in our large cities, pass through child-birth unscathed, although they live under insanitary conditions, with the absence of ordinary cleanliness of person, of clothing and of bedclothes, and are attended by Sairey Gamps who are by no means cleanly either in person or in methods, can only be explained by supposing that they have acquired a large degree of immunity to certain pathological germs in consequence of constant or frequent exposure to them.

It is evident that there is transmitted by the plasm some influences which modify the severity of infectious diseases, because epidemics, notably of measles and smallpox, are much less severe in populations which have been visited by them from time to time than they are when they occur in virgin soil, *i.e.* in peoples among whom the disease has not occurred for generations.

Except syphilis there are no inherited diseases (the cases of inherited tubercle are so few that they may be neglected), but children may be born with tissues which have a greater or a smaller power of resistance to unfavourable influences, to particular diseases, a greater or a smaller tendency to certain changes in, or degenerations of certain classes of cells. For example, in some persons a very small error in self-management will induce an attack of gout, whereas in others no amount of excess, even if persisted in for a long period, will induce an attack.

Conclusions.—A consideration of all the preceding facts leads

us to conclude that there are very marked differences in the plasm which occurs in different families and types of families and individuals—very subtle differences it may be, differences which cannot be detected by the microscope, but which are clearly evidenced by the method and the results of vital processes. The quality of the plasm determines the health and well-being, or the reverse, of the individual; it determines also the power of resisting morbific influences and the power of recuperating from disease.

Prophylaxis.—From the results of sanatorium treatment we have learned, or at least have had more clearly demonstrated, the value of fresh air, the importance of attending to nutrition and of regulating the wear and tear in accordance with the results of exercise in each particular case. We have yet much to accomplish in educating the public in prophylaxis, how to raise the resisting power of the tissues against the onset of disease. We must recognise the necessity of diminishing the infection of common colds, the cause of a large amount of inconvenience and illness, even serious illness in young children and aged persons, the necessity of insisting on the complete cure of bronchial catarrh, especially the catarrh of measles which so often prepares the way for tubercle, also the catarrh of influenza, which, if neglected, is followed by pneumonia. We must see that in patients with tubercular or rheumatic history slight injuries should be treated seriously.

Treatment in Relation to Constitution.—In the treatment of disease it is important that we bear in memory that we are not called on to treat diseases as entities, but individuals who suffer from certain types of morbid processes modified by their constitution. If we are able to discover any marked constitutional condition in any patient we shall more rapidly cure the disease if we modify our treatment in accordance with the constitution. This was impressed on me soon after I began practice. A young man, whom I was attending for acute bronchitis, made no progress, his temperature continued high and the bronchitis persisted. I had failed to find evidence of any marked constitution, he was of dark complexion, had never suffered from rheumatism nor from specific disease, and his family was not gouty. One morning on entering his bedroom I perceived the odour which is common in rheumatic subjects; the patient was at once put on antirheumatic treatment, which was followed by rapid improvement and recovery. A year later he passed through

an attack of acute rheumatism with endocarditis, which justified the diagnosis. Laryngitis in a gouty person is more rapidly cured when we prescribe diet and medicine suited to the depraved metabolism which exists in the gouty. So also if a constitution has been modified by malaria it is often beneficial to give quinine, and we give it in much larger doses than we would prescribe for others. If the constitution has been modified by syphilis, then KI, arsenic or mercury, alone or in combination, will be useful in addition to remedies which would otherwise be suitable. The manifestations of disease in the nervous constitution are very numerous, because the due performance of all the functions of the body depends on the healthy, well-balanced state of the nervous system. An extravagant appreciation and a misapplication of this fact has led to the formation of a cult which arrogates the title Christian Scientists. Persons of nervous constitution require relatively smaller doses of medicines than others. Alcoholics and opiates we give with caution because of the greater danger in that constitution of inducing a drug habit. Even in such illnesses as threatened abortion, or in colic and diarrhœa following intestinal catarrh, we find it important to treat the constitution by giving bromides. In some joint diseases in nervous patients the constitutional is of more, or at least as much, importance as the local treatment. In all nervous patients the general nutrition must be carefully guarded, especially at the period of development, the climacteric, and during child-bearing. In all patients a mind at rest, faith, hope, are important factors for recovery, specially a mind at rest as to spiritual interests, but these are of more importance, more potent factors in those of nervous constitution than in others.

Now, Gentlemen, I thank you heartily for your forbearance with my defects, and for the support which you have afforded me during my tenure of office. I have now much pleasure in vacating the chair in favour of Dr. Byrom Bramwell, who has in the past contributed very largely to the interest and success of our meetings, an energetic and untiring worker, a most able clinician, who well deserves every honour which the Society can bestow.

VALEDICTORY ADDRESS TO THE FELLOWS OF THE OBSTETRICAL SOCIETY.

By WM. STEPHENSON, M.D., F.R.C.S.,
Retiring President.

Gentlemen — Fellows of the Obstetrical Society,— Quickly, pleasantly, and profitably have the two years passed during which I have presided over your meetings. The term of office now expires, but the honour you conferred on me of adding my name to the list of your Presidents will endure as long as this Society itself.

Again would I express my heartfelt thanks, all the more because exceptional circumstances are connected therewith. In your choice of President you went far afield. For better or for worse, after my transference from Edinburgh to Aberdeen thirty-four years ago, my connection with the Society dwindled into that of "Corresponding Fellow," whatever that term may imply —certainly, in my case, the function was fulfilled by not once contributing to the *Transactions*. However, I have now developed into a so-called "Ordinary Fellow," and I fondly hope I may not again relapse into my former state. Let the interest I have felt in the work of the Society during these two sessions atone for my previous remissness. The pleasure I have enjoyed, and the kindness and hospitality I have received, have well repaid the journeys up to town. These have afforded regular periods of rest and refreshment to mind and body. No small part of the pleasure has been the renewal of friendships formed in early days. Many members have passed away, but I rejoice to see some of "the old familiar faces" still around the table. An additional benefit has been making the personal acquaintance of the younger men who are so ably and enthusiastically carrying on the work of the Society. Often have I felt that frequenting the meetings of our brethren, wherever they are, is an invaluable aid in maintaining the spirit of youth, and in resisting the inroads of age. The softening of brain-interests is an early sign of senility.

One evening, when glancing over the last volume of *Transactions*, I was startled to find in the chronological list of Ordinary Fellows that my name comes first, with the date 1861. I gladly note, however, that I am not the senior member. The *doyen* of the Society is the venerable Dr. George Skene Keith, who joined in 1845, and whose marked vitality and strength confirm the

force of his *Plea for a Simpler Life.* I may take the liberty of adding that he was an alumnus of Marischal College, Aberdeen, in the years 1834 to 1837, graduated M.D. in Edinburgh, 1841, and that in 1896 Aberdeen University conferred on him the honorary degree of LL.D.

The next in seniority is one, the appreciation of whose services you recently expressed by elevating him to the position of Honorary Fellow, the Emeritus-Professor of Midwifery, Sir Alexander R. Simpson, LL.D. He joined in 1858. How keen and continuous his interest in, how abundant his services to, the Society you all know. Long may he be spared and able to move amongst us.

A Corresponding Fellow joined in 1860 — George Milburn, M.R.C.S., of London. He does not appear to have contributed to the *Transactions.* Though, strictly speaking, this places me fourth in seniority, yet I may regard myself as second amongst the active members.

I rejoice to note the continuous prosperity of the Society, now entering on its seventy-first session. The membership is well maintained, the attendance at the meetings shows no falling off, the character of the papers read, the number and nature of the specimens shown, indicate much activity in the fore-rank of obstetric and gynæcological advance. What the Society is suffering from is a plethora of interesting contributions compared with the time available for their discussion. This has been noticeable on several occasions.

It has happened that a scientific contribution has preceded one of great practical interest; the subject of the former most interesting, but on which few can speak, whilst the latter, which many could criticise, comes on so late that it is hurriedly read, and little or no time is left for discussion. The benefit of many a good paper is thus lost, and little satisfaction given to the author for the pains he has taken in its preparation. The President and Secretaries should be granted some discretion and power in accepting contributions, and determining when they should be read. It also would give variety once in a session were some particular night or special meeting allotted for discussion of some subject, as is done in the meetings of the British Medical Association.

It is a fitting custom for the retiring President to make reference to the members who, during his term of office, have been taken from us by death. During these two years the shadow has fallen widely. Twenty of our number have passed

away, one Honorary, six Corresponding, and thirteen Ordinary Fellows.

The name of the Honorary Fellow, the loss of whom is felt throughout the medical world, is Charles J. Cullingworth, M.D., D.C.L., LL.D. Occasionally I have had the privilege of spending some hours in his company—the last occasion was in 1904, when he came to Aberdeen to receive from the University the degree of LL.D. He looked hale and hearty then, but I noted the solicitude and care with which his devoted wife watched and guarded him from fatigue, unaware, till she told me, that he had received the first warning of angina. The pleasing memories of personal friendship intensify the feeling of loss.

Born in Leeds, 1841, Dr. Cullingworth studied medicine there, and in 1869 settled in practice in Manchester. The exceptional ability and character of the man was soon recognised. By dint of earnest work and a strong attractive personality, he attained to a high degree of professional eminence. Rarely do we find in one man so full and well balanced a combination of admirable characteristics; a courteous, cultured gentleman, an indefatigable worker with great business capacity, strenuous for the advancement of his art and the public welfare, yet, with all, indifferent to self-interest and the plaudits of the world.

In the early years of practice he was appointed Surgeon to the Police. This directed his attention to medical legal subjects, on which his early papers were written. These led to his appointment as Lecturer on Medical Jurisprudence in Owen's College, Manchester. In 1873 he became Surgeon to St. Mary's Hospital for Women in that town. His energy was thus directed to gynæcology and obstetrics, the department in which he subsequently made his reputation. In 1885 the Chair of Midwifery in the Victoria University became vacant, and with little opposition Cullingworth was appointed. This post he had held for three years only when, from the reputation he had acquired as a lecturer, clinician, and operator, he received an invitation, which he was induced to accept, to become Senior Obstetric Physician at St. Thomas's Hospital, London. This was in 1888, and in London he spent the remaining twenty years of his life in continuous work for his profession and the public weal.

He occupied the Presidential Chair of the London Obstetrical Society during 1898 and 1899, and in the first of these years this Society elected him an Honorary Fellow. In 1904 the University of Aberdeen, as already stated, conferred upon him the degree

of Doctor of Laws. In the same year he retired from the acting staff of St. Mary's Hospital. He contemplated rest by residence in the country, but four years later death found him still resolutely working. He had undertaken the arduous duties of editor of the *British Journal of Obstetrics*, was an active member of the Midwives' Board, and interested himself in other public measures.

Much that Cullingworth wrote now lies buried in the journals of the day. His contributions to the *Transactions of the London Obstetrical Society* are, however, readily accessible. They are models of what such papers should be—well worthy of study by young writers.

It would be an interesting historical study, on which it was my intention to enter on the present occasion, to trace the influence of Cullingworth's work and writings on the development of opinion regarding surgical interference in many pelvic affections, but the subject proved too large for the time at disposal, and did not accord well with the nature of a valedictory address.

In the long list of Fellows whose loss we mourn, one name stands prominently forward as more intimately associated with the work of this Society. From 1872 Dr. Charles E. Underhill was a familiar figure at the meetings. He, too, had a strong and attractive personality. Endowed with a tall, handsome figure, a sympathetic, generous nature, marked courtesy and dignity of manner reminiscent of olden times, refined culture, a reliable judgment and business talent, and, with all, an unassuming, retiring disposition, with a vein of quiet humour, he was respected, admired, and beloved by all who knew him.

The esteem of his professional colleagues is manifest in the many honourable posts he from time to time held. In this Society he was Secretary from 1875 to 1879; Librarian, 1879 to 1883; Vice-President, 1884, 1885; and President, 1888, 1889. This last year was the jubilee of the Society, and it will be remembered how acceptably he presided at the celebrations. In his valedictory address he gave a graphic and interesting history of the Society from its formation, to be found in vol. xv. of the *Transactions*. From time to time he had also been President of the Royal Medical Society, the Harveian Society, and the Edinburgh branch of the British Medical Association. For a time he was the representative of the profession on the Board of Managers of the Royal Infirmary. In all these capacities, by his knowledge of business and his tact, he rendered valuable services.

Finally, even when his health was failing, he accepted, more from a self-sacrificing sense of duty than desire for honour, the office of President of the Royal College of Physicians, and in that position, beloved and revered, he died.

Dr. Underhill's work for this Society was not limited to his official duties. In the *Transactions* (see vol. xxi.) he is credited with contributing twenty-two papers, exhibiting twenty specimens, taking part in one hundred and three discussions, and sharing in nine Reports of the Maternity Hospital. Of the specimens, there were seven relating to monstrosities and prenatal conditions; he was thus a forerunner in a subject which a junior Fellow has made pre-eminently his own. Five of the contributions relate to the structures of uterine polypi, and these papers have been frequently referred to by writers. Another valuable paper describes the uterine mucous membrane of a woman who died immediately after menstruation, and clearly refutes the opinion of Sir John Williams and others that in the process the mucosa "becomes entirely removed."

The next name recalls to the inner eye an erect figure above the average in height, well proportioned in body, clothed in academic robes, a large head and quick, observant eyes, a genial and hearty expression in action as well as in words, warmly greeting friend after friend as he moves about in a large assembly —evidently some one of importance. It is the well-known Dr. P. A. Young, late Treasurer of the Royal College of Physicians, Edinburgh, on whose business talent and assiduous care the success of many a banquet has depended. This post he held for many years. In the same capacity as treasurer he devotedly gave his services to the Edinburgh Medical Missionary Society, and he took special interest in the University and other Temperance Associations. Graduating M.D., 1870, he joined this Society in the year following. Although the author of several papers in the medical journals, he contributed to the *Transactions* only by the frequent part he took in discussions. Well known and highly esteemed, his familiar presence will be sadly missed.

Of the remaining Ordinary Fellows who have died within the two years, mention of the names alone can be made. It is a sad list. W. Spalding, Gorebridge; John Archibald, Bournemouth; Hugh M'Callum, Rannoch; A. S. Duncan, Polton; D. W. Johnston, South Africa; George Dickson, Edinburgh; D. R. Murray,

Leith; A. J. Duncan, Dundee; Thomas Easton, Stranraer; W. A. Finlay, Trinity, who devoted himself to Surgery, was on the acting staff of Leith Hospital and Lecturer on Clinical Surgery. To this list has to be added the name of Miss Mary Hamilton, of Cornwall, the third lady member who has died.

From the list of Corresponding Fellows six names disappear. The most notable is that of Sir Arthur Mitchell, K.C.B., LL.D. Whilst he was chiefly known as the eminent Commissioner in Lunacy, he was interested in and wrote on various subjects. His connection with this Society arose from his valuable researches on "The Effects of Difficult Labour and Plural Births on the Production of Idiocy." He graduated M.A. at King's College, Aberdeen, 1845, and M.D., 1848. In 1876 his Alma Mater conferred on him the honorary degree of LL.D.

The next to be named is G. Engelman, M.D., Kreuznach. In May 1877 he communicated, through Dr. Matthews Duncan, a paper on "Fibrous Tumours of the Uterus," in which he gave an analysis of 307 cases, together with the treatment by the use of Kreuznach waters. In 1891 he returned to the subject in a second paper, detailing his larger experience. Those interested in the medical treatment of such tumours will find these papers of interest and value. They are given in full in vols. iv. and xvi. of the *Transactions*.

W. J. Brock, M.D., D.Sc., was well known in this city. Whilst engaged in general practice he, for a time, was interested in obstetrics. He held office in the Maternity Hospital, Glasgow, and joined this Society in 1880, reading one communication on "Obstinate Vomiting in Pregnancy." Subsequently he devoted himself wholly to Public Health. He was highly esteemed for his many good qualities.

J. Limont, M.A., Edinburgh, 1878, B.Sc., 1879, M.B.C.M., 1880. He was for a term Resident in the Maternity Hospital, Edinburgh, and joined this Society in 1887. After settling in Newcastle he devoted his attention to Clinical Medicine.

Dr. H. R. L. Veale, of London, was elected Corresponding Fellow in 1861. I have been unable to find any information regarding him.

The last name to be mentioned is Mr. William Thomson, L.R.C.P.&S., Wrenbury, Cheshire, admitted Corresponding Fellow in 1867. He was unknown to any member now living, and never attended a meeting, but at my suggestion he communicated, 13th March 1867, a short paper entitled "A Few Notes of a

Country Obstetric Practice."[1] His experience was remarkable, many would say incredible, but I can vouch for the accuracy of his statements, knowing his character, and having assisted him frequently in his practice. Let me quote two or three of the striking facts from the papers. "During nearly eighteen years' residence in Wrenbury I have attended above 2200 cases of midwifery . . . and of that number I have had no fatal case. Two deaths have occurred, but neither would be reckoned as deaths from puerperal causes in strictly-kept statistical tables."

He further says, "I have also only required to deliver by forceps three times . . . both mothers and children did well."

"Again, the most serious and frequent complication I have met with has been placenta prævia, and of these I have had fifteen cases, either partial or complete . . . in one of those women the same thing happened four times in succession at the sixth or seventh month of pregnancy . . . all the mothers in the end did well, but I saved only the lives of two of the children." "At one time I feared I should have to decline practice owing to puerperal fever. Thirteen successive cases occurred, all taken on the third day after delivery, but varying much in particular symptoms. If true puerperal fever, it is remarkable that all recovered: but if not, it was a strange coincidence that during that time not one whom I attended escaped the seizure till thirteen had suffered, and that as suddenly as the inroad had occurred so suddenly and entirely did it disappear." In the present day this coincidence does not appear so "strange." The experience of Mr. Thomson is very exceptional, and could occur only under exceptionally favourable circumstances. I am able to state that he modified his management of labour in his later life, using the forceps more and ergot less, and, possibly, as the character of the district changed, the results were less favourable.

It is well for us, in the present day of midwifery impatience, to recall the experience of former days. In our teaching there is less consideration paid to the management of ordinary uncomplicated labour and more attention given to instrumental than to non-instrumental aids to delivery.

Gentlemen, my last duty is performed. I leave this honourable position with mingled feelings of pleasure and regret—regret from the consciousness of my many deficiencies, and pleasure in knowing that my successor, an old friend, is one who, by his ability, reputation, and success, is so well qualified to add lustre to the office of President.

[1] *Edin. Med. Journ.*, July 1867.

BÉRANECK'S TUBERCULIN AND ITS METHOD OF APPLICATION.

Being a Lecture Delivered Before the Class of Clinical Medicine in the Royal Infirmary, Edinburgh.

By Professor ED. BÉRANECK,
University of Neuchâtel, Switzerland.

Tuberculosis is a microbic disease. As such, its evolution depends on two factors:—

1. The tubercle bacillus and its biological properties.

2. The state of the defensive mechanism of the organism in which the development of the bacillus is to take place.

No doubt the virulence possessed by the tubercle bacillus is only contingent and is not constantly manifest. The possibility of tuberculous infection depends primarily on the second factor, which is liable to very great variation. The resistance offered to the evolution of tuberculosis differs much in different individuals.

As a general rule, the disease is chronic in course. That is to say, infection spreads more or less slowly in the organs invaded by Koch's bacillus, giving rise to the anatomico-pathological lesions with which you are all familiar. As the bacillary infection progresses, there appear—earlier or later, according to the individual—symptoms of general intoxication. The chronic advance of tuberculosis is related to the pathological properties of the toxins produced by Koch's bacillus. Of these, the soluble, or exotoxins, diffuse readily throughout the body. Others, the endotoxins, adhere to the bacilli and diffuse with great difficulty. The latter constitute the strongest weapon of the tubercle bacillus. They enable it to resist the bacteriolytic action of the body's protective cells and gradually to produce necrosis of the invaded tissues.

Tuberculous toxins do not possess the formidable toxicity of diphtheritic or tetanic toxins. They act more silently, more slowly. Under the influence of the tuberculous exotoxins, and especially the tuberculous endotoxins, the body's means of defence are gradually paralysed, and, if timely intervention be not made, the break-down becomes complete.

How are we to oppose tuberculous infection and intoxication? As I said at the Washington Congress:[1] "We must seek to

[1] Ed. Béraneck, International Tuberculosis Congress, Washington, 1908.

(1) check infection by reinforcing the resistance of the leucocytes to the necrosing action of the tubercle bacilli, and by activating the bacteriolytic power of the leucocytic diastases; and (2) encourage the production of antibodies which will neutralise the toxins secreted *in vivo* by the tubercle bacillus."

The goal of our efforts is to enable the body to withstand tuberculous infection through increase of the natural defensive mechanism by a process of vaccination. Needless to say, this attempt at vaccination can be made only with the help of tuberculous toxins. The toxins must satisfy the following conditions:—

1. They must be soluble, so that exact dosage may be possible.

2. They must be less toxic with regard to the body's protective cells than are the toxins produced *in vivo* by the tubercle bacillus.

3. They must be absorbed and digested by the protective cells so that the resistance of these cells to the pathogenic action of the tubercle bacillus may be increased and their bacteriolytic function stimulated.

I have sought to prepare a tuberculin which would satisfy as far as possible these conditions, that is, which would contain tuberculous toxins of relatively weak toxicity, and yet be capable of acting as a vaccine in relation to toxins in process of elaboration by the tubercle bacillus in the tissues. In this connection, I would insist that a *tuberculin is not a serum*, it does not contain antibodies, and consequently, *per se*, it does not exert antitoxic action.

In the struggle against tuberculous infection, therefore, my tuberculin takes part only indirectly, acting as a stimulant and a vaccine to the protective cells, which left to themselves are powerless to rid the body of the bacilli. We may not lose sight of the fact that this vaccination is extremely difficult of attainment since the defensive mechanism of the individual concerned has already become more or less inhibited by the tuberculous infection.

Since the tubercle bacillus attacks its host both by exotoxins and by endotoxins, I have prepared a tuberculin containing the two groups of toxins. The exotoxins of my tuberculin include the soluble toxins secreted by Koch's bacillus in a special bouillon. This bouillon is derived from a glycerinated maceration of veal, not neutralised. Commercial peptones are excluded, since these exert of themselves a thermal and toxic action on the tuberculous subject. After cultivation of the tubercle bacillus,

the bouillon is passed first through paper, then through a Chamberland filter, and is subsequently concentrated, *in vacuo*, to a syrupy consistency. The tuberculous exotoxins contained in my culture bouillon are by no means identical with, although belonging to the same family as, those produced by Koch's bacillus in the human body. They are only slightly toxic, and their vaso-dilator effect is slight.

The tubercle bacilli cultivated on my bouillon and separated therefrom by filtration are next carefully washed in water and immersed in 1 per cent. orthophosphoric acid which extracts certain endotoxins. These are more toxic than the exotoxins. Their vaso-dilator effect is similarly slight. A mixture of equal parts of the culture bouillon, filtered and concentrated *in vacuo* (exotoxins), and the bacillary extract, obtained after immersion in orthophosphoric acid 1 per cent. (endotoxins), constitutes my tuberculin. If the two solutions are mixed pure in equal proportions precipitation occurs. In order to avoid this, a certain dilution is necessary. Thus, by combining 19 c.c. sterilised distilled water with 0·5 c.c. of the exotoxins and 0·5 c.c. of the endotoxins, the liquid remains clear. This dilution of $\frac{1}{20}$ represents the "original" tuberculin solution from which all the others are prepared.

My tuberculin is but slightly toxic for the normal subject. Injected subcutaneously even in very large doses, it fails to kill. On the other hand, in the tuberculous subject a minute dose produces thermal or other reaction. The tuberculous patient often reacts to a hypodermic injection of 0·000001 c.c. of this tuberculin. In certain especially susceptible patients so minute a dose as 0·00000006 c.c. cannot be exceeded without reaction taking place. Curiously enough, the extra-susceptible subject sometimes derives astonishing benefit from the injection of such infinitesimal doses.

My tuberculin contains both tuberculous exotoxins and tuberculous endotoxins. This fact, however, is not sufficient to justify the use of the tuberculin in therapeutics. In order to act as a vaccine, these toxins must be able to impart at least some degree of immunity against experimental tuberculosis. Experiments show that my tuberculin increases an animal's power to resist tuberculous infection. The life of animals thus treated is sometimes prolonged very considerably beyond that of the "control" animals. The immunity acquired by treatment with my tuberculin is not absolute. In the case of guinea-pigs at least, which are extra-susceptible to

tuberculous infection, it is only relative. The acquired immunity is sufficient, however, to show that the toxins contained in the tuberculin stimulate the protective cells of the organism in their struggle against tuberculosis, and reinforce the resistance of these cells to the pathogenic action of the bacillus. The immunising properties of the tuberculin will produce their entire therapeutic effect only if the body's protective cells be still in a condition to admit of stimulation by tuberculin. The issue depends on a close collaboration of the tuberculin, which acts as a vaccine, with the body's intrinsic means of defence. It is important, therefore, that tuberculin treatment be not delayed till the patient's physical debility is too advanced and his defensive agents are no longer able to respond to the stimulating action of the inoculated vaccine toxins. The vaccine toxins of my tuberculin must actually be absorbed and assimilated by the protective cells in order that the resisting power of the cells be increased and they themselves rendered refractory to the pathogenic action of the bacillus. The vaccine properties of my tuberculin are constant. On the other hand, the aptitude of the patient's defensive mechanism to assimilate the tuberculin and become vaccinated thereby varies not only in different individuals, but in the same individual at different stages of the disease. Consequently the aptitude will be found at its maximum if we inoculate doses of tuberculin which are in harmony with the patient's physiological requirements. If a dose be too strong it will exert of itself a certain toxic action on the defensive mechanism, with the result that the desired vaccination will be impeded rather than stimulated.

Theoretically, then, in course of treatment by my tuberculin there are to be considered:—(*a*) Neutral doses; (*b*) beneficial (or optimal) doses; (*c*) noxious doses. Neutral doses are those which, although well tolerated by the patient, seem to have no appreciable therapeutic effect on the tuberculous symptoms. They are very weak—homœopathic, so to speak—and it is with such that treatment should commence. Beneficial (or optimal) doses are well tolerated, and favour in high degree vaccination of the protective cells. From the therapeutic standpoint they lead to amelioration of the tuberculous symptoms. They are in complete harmony with the patient's physiological needs and his capacity for vaccination. Noxious doses are those which exceed the demand of the organism for vaccine toxins. They provoke pyrexic or other reaction, more or less strong, indicating an overdose of tuberculin. Frequent repetition of these noxious doses impedes

vaccination. They strain the patient's defensive resources, and eventually lessen the possibility of cure.

From what has been said, it is clear that a course of treatment with my tuberculin should be pursued without provoking appreciable reaction. Neglect of this important rule has led in time past to the assertion that tuberculin therapy is not applicable to febrile forms of tuberculosis, and that only apyrexic cases are suitable for this mode of treatment. This opinion was intelligible when one started with the false assumption that in order to be effective tuberculin treatment must be accompanied by more or less strong reactions—pyrexic or other. To increase fever in already febrile patients would seem neither logical nor advisable and so men refrained from applying tuberculin therapy to this large category of tuberculous patients. This was a mistake. If we reflect that my tuberculin acts therapeutically only through the medium of the protective cells, which it is called upon to stimulate, and if we regulate dosage so that injections excite no reaction and correspond to the vaccination capacity of the patient, we shall find that tuberculin is applicable as well in the treatment of febrile as of afebrile forms of tuberculosis.

My tuberculin is a powerful antipyretic agent, provided the patient's defensive mechanism be still able to respond to its vaccinating properties. The optimal dose, *i.e.* that which produces an antipyretic result, may be infinitesimal, sometimes not exceeding 0·00000006 c.c. of my tuberculin. It varies with the individual. As I have said elsewhere:[1] "The optimum dose can only be found in each particular case by groping after it. For this, two things are necessary—careful observation of all the symptoms, and a cautiously graduated dosage. If the injection is accompanied by some reaction, either general (temperature, pulse, weariness) or local (at the point of inoculation), it is a sign that the optimum dose has been exceeded and that a smaller must be reverted to. It goes without saying that several varying optimum doses may be noted in the course of treatment, for this dose is nothing but an adaptation, as nearly accurate as possible, of the injected toxins to the physiological requirements of the body's means of defence. This adaptability is liable to self-modification in the course of the disease, and it will then only be satisfied afresh by different doses of tuberculin, stronger or weaker, according to the circumstances of the moment."

It seemed as though Wright's method would afford a scientific

[1] *Medical Annual*, 1909.

and practical basis which would allow of rational direction of the specific treatment of tuberculosis. Clinical experience shows that the opsonic index, while of scientific interest, cannot of itself control the progress of tuberculin treatment of tuberculosis, or serve as a determinant of the optimal doses suitable for different cases. I am entirely of the opinion expressed by Dr. Philip, of Edinburgh, when he says:[1] "The possession of an exact gauge for the regulation of tuberculin dosage is certainly desirable. This would seem to be promised in the determination of the opsonic index of the blood from day to day. . . . Interesting facts have emerged regarding the variations which occur in the blood at different stages of tuberculous infection. . . . But after comparison of results obtained where the opsonic index was determined, and those obtained apart from such determination, I feel doubtful if the method can be credited with all the significance which has been ascribed to it. Prolonged experience with and without the method justifies the statement that, apart from estimation of the index, other clinical evidence is usually sufficient for the regulation both of amount and frequency of dosage."

Before proceeding to consider the methods of application of my tuberculin in the treatment of tuberculosis, both internal (pulmonary, renal) and more strictly surgical, it will be necessary to give the scale of different solutions which are available for medical use. The scale has been established by Dr. Philip as the result of clinical observation extending over several years. The solutions are as follows:—

Tbk1	1 : 10 of my tuberculin	1	20.
Tbk2	1 : 100	,,	,,
Tbk3	1 : 1,000	,,	,,
Tbk4	1 : 10,000	,,	,,
Tbk5	1 : 100,000	,,	,,
Tbk6	1 : 1,000,000	,,	,,

The technique of the injections varies according to the form of tuberculosis to be treated. In cases of internal tuberculosis, in which regard is had exclusively to the stimulating and vaccinating function of the tuberculin on the body's defensive mechanism, we have recourse only to hypodermic methods, all reactions, pyrexic or other, being carefully avoided.

In non-pyrexic cases treatment should be commenced with 1/10 c.c. of Tbk5. At least three days should elapse after each

[1] Philip, *British Journal of Tuberculosis*, London, 1907.

injection before the next be made. The initial dose should be repeated a certain number of times so as to ascertain its effect. Should a reaction ensue, the dose must be reduced to 1/20 of Tbk5, or even 1/10 c.c. of Tbk6. If, however, 1/10 c.c. Tbk5 be well tolerated, and if, after a certain number of repetitions of the same dose, its effect cease to appear, a stronger dose, say 3/20 c.c. Tbk5, should be given, and so on. The dose should not be increased by more than 1/20 c.c. Progress from dose to dose must be slow, and conspicuous reactions avoided, until, at last, a dose is reached which has a beneficial effect, no matter how small, on one or other of the tuberculous symptoms. This is the first optimal dose. It should be maintained so long as its beneficial effect lasts. Let us suppose this optimal dose to be 5/10 c.c. Tbk5, and that after a certain length of time its beneficial effect becomes exhausted. We proceed then to increase the dose by 1/20 c.c., progressing thus slowly until 1 c.c. Tbk5 is reached. If this dose be well tolerated, we pass to 1/10 c.c. of Tbk4 and pursue the same procedure as for Tbk5. Similar procedure is followed for the other solutions of my tuberculin, Tbk3, Tbk2, Tbk1. Clinical observation shows that sometimes the first optimal dose is already reached by some twentieths c.c. of Tbk5, and that cicatrisation of tuberculous lesions can be effected by the employment of this weak solution alone. It is thus not necessary to go through the entire scale of solutions Tbk6 to Tbk1 in every case. Treatment must be individual. It should be regulated in accordance with the vaccination potential of each particular patient. But, as has already been pointed out, in order that there be no risk of exceeding, at the outset, the optimal dose, in all non-pyrexic cases we must commence with the mild dose of 1/10 c.c. Tbk5.

Pyrexic cases of internal tuberculosis, in view of the intoxication existing when specific treatment is commenced, must be treated still more cautiously than non-pyrexic cases. In pyrexic tuberculosis the first dose should be 1/20 c.c. of Tbk6. Dosage must be increased very gradually, *i.e.* each dose must be repeated at least eight or ten times before it is increased, and the amount of the increase never exceed 1/20 c.c. This very gradual increase of dosage facilitates the discovery of optimal doses which occur in the course of treatment.

Briefly to summarise. In internal tuberculosis, both non-pyrexic and pyrexic, the aim of my tuberculin treatment is to vaccinate as completely as possible the patient's protective mechanism against the pathogenic action of the tubercle bacillus.

But the body that we attempt to vaccinate is already more or less intoxicated with tuberculosis. Its vaccination potential is reduced. The balance will be restored when the inoculated doses of tuberculin correspond most nearly to the patient's physiological needs and produce a beneficial therapeutic action (optimal doses). It happens frequently that the optimal dose is a very weak dose of tuberculin. Hence the necessity for carefully graduating dosage so as to avoid any possible overcharging of the body with vaccine toxins (tuberculin). Should such overcharge occur, it is signified by a reaction, thermal or other. A course of my tuberculin treatment in internal tuberculosis should, if properly conducted, be unaccompanied by reaction.

This statement, absolute as it is for the treatment of internal tuberculosis, does not apply—with the same strictness, at least — to treatment of more "surgical" tuberculosis. While in internal tuberculosis we avoid reactions, in surgical tuberculosis, on the other hand, we aim at provoking a local reaction whose intensity may be gauged. The contradiction is more apparent than real. The pathological conditions which regulate procedure in tuberculin treatment are usually different in the two groups. In surgical tuberculosis we are generally better able to determine the importance and extent of the tuberculous foci. As a rule we can reach the foci of disease without much difficulty. The reactions which result from specific treatment have no troublesome influence on the patient's general and local condition, provided they are proportionate to his power of resistance.

In the conservative treatment of surgical tuberculosis the aim is less to heal the tuberculous foci by vaccinating the body's defensive mechanism. We are content to provoke, if possible, cicatrisation of foci by means of suitable local reaction. Such beneficial local reaction may be produced sometimes by the use of injections, *e.g.* of iodoform, chloride of zinc, &c., or by Bier's venous stasis. It may then be asked, Why not use for such cases intrafocal injections of tuberculin, as recommended by me many years ago? In addition to its vaccine function—which is certainly the most important—my tuberculin in concentrated form acts as a bactericide *in vitro*. Observations show that Koch's bacillus is killed by forty-eight hours' immersion in this concentrated tuberculin. Even in dilution of 1/20 my tuberculin acts with marked attenuating effect on the virulence of the bacillus. Still weaker dilutions render the soil less propitious for the development of the bacillus, and attract greatly the phagocytes into the inoculated tuberculous

foci. This bactericidal property, or the simpler power of attenuation, is due to the bacillary extract (endotoxins) contained in the tuberculin, and to the orthophosphoric acid which is used as solvent.

By inoculating tuberculous foci with my tuberculin, we act directly on the bacillus, and stimulate a cicatrising reaction in the affected tissues. Intra-focal injections do not fulfil the same end, or produce the same results, as hypodermic injections. The latter exert a curative effect by influencing the body's defensive mechanism, thereby increasing the patient's general power of resistance to bacillary infection. The chief activity of intra-focal injections is, on the other hand, local. Their curative effect is attained by diminishing the vitality of the bacillus, and furthering sclerotic change in the tuberculous tissues. This method of cure does not depend on general vaccination of the body. Its action is limited to the foci immediately under treatment. Let us suppose, for instance, that a patient presents two independent tuberculous foci. It will be necessary to treat each focus separately with intra-focal tuberculin inoculations. To obtain cicatrisation, we must have recourse to solutions of tuberculin of comparatively high concentration, exhibited in large dose. According to the extent of the focus and the patient's general condition, we commence with an intra-focal injection of, say, 1/10—1 c.c. of Tbk3 or even Tbk2. As a result of such intra-focal injection, a reaction takes place in the inoculated area. The reaction is characterised chiefly by the appearance of large numbers of phagocytes, and by disintegration of tuberculous tissue. If often happens that, as an accompaniment of the latter process, an abscess forms which, on evacuation, closes. This conduces to healing through the discharge of dead tuberculous material. The focal reaction occasioned by tuberculin inoculation is always accompanied by a general or thermal reaction of varying extent. Before repeating an injection, it is well to wait until all reaction, local as well as general, has ceased. The intensity of reaction is regulated by diminishing or increasing the dose of tuberculin. Clinical observation shows that intra-focal injections with my tuberculin are entirely safe. Sometimes the curative effect of the injections appears very early. In other cases it is delayed. This depends, doubtless, on the extremely varying reactivity of the body. In some persons intra-focal injection provokes at once a pronounced local reaction, manifested externally by an exudative swelling which is absorbed more or less gradually. In other persons the same dose of tuberculin occasions merely

a slight local reaction, with hardly any swelling. The former group, with rapid and unmistakable reaction, benefit most by this mode of treatment. This is especially the case with articular tuberculosis, where cure is quicker and functional recovery more complete.[1]

Needless to say, my tuberculin cannot work miracles. It cannot regenerate tissues which have been destroyed by tuberculous infection. The less pronounced the lesions and the smaller their extent, the better will be the result, from the functional as well as from the curative point of view. On this point I may quote the opinion expressed by Dr. Roux, Professor in Lausanne, at a meeting of the Société Vaudoise de Médecine: "As regards anatomical repair, it is interesting to note that in successful treatment with Béraneck's tuberculin the results actually obtained in practice are exactly those to be expected *à priori*. That is to say, if the tuberculous area is small and limited, and the articular *culs-de-sac* are still sufficiently large, restoration of movement may be expected. If, on the contrary, there has been much proliferation of synovial membrane, there will continue some degree of proliferative synovitis, even when the tuberculosis is healed. Lastly, in a suppurative case with fistulous formation, &c., all we can expect is a fibrous cicatrix, *i.e.* an ankylosis which may possibly require orthopedic resection, but which we must not attribute to failure of tuberculin treatment." Further, Dr. Roux says: "A striking and apparently paradoxical fact is, that it is actually the severer forms, those with fistulæ, for example, which have been found to benefit more rapidly by tuberculin treatment than one would have presumed to hope."[2]

The intra-focal method of tuberculin injection is not applicable in all cases of surgical tuberculosis. It is contra-indicated, for instance, in cases of surgical tuberculosis accompanied by pulmonary or renal lesion, because of the thermal or other reaction which it causes. Such cases, however, may be treated by hypodermic injection, according to the method already described. Further, intra-focal injection is contra-indicated in "obscure cases where localisation of lesion is not exact, or where operative procedure is doubtful or has been fruitless."[3] In such cases the hypodermic method should be employed.

[1] De Coulon, "Traitement de la Tuberculose osseuse avec les injections focales de Tuberculine Béraneck," *Revue médicale de la Suisse Romande*, 20th June 1907.

[2] *Revue médicale de la Suisse Romande*, No. 8, 1906.

[3] Philip, "Surgical Bearings of Tuberculin," International Congress on Tuberculosis, Washington, 1908.

Ocular tuberculosis lends itself especially well to the study of the curative action of tuberculin. Yet it is only since 1905, or even later, that, following the observations of v. Hippel and his pupils, tuberculin has been employed in the treatment of tuberculosis of the eye. At first Koch's tuberculin T.R., and subsequently his bacillary emulsion, was used by v. Hippel. Then Dr. Dor, of Lyons, sought to determine whether other tuberculins might not afford equally good results. He treated eight cases of ocular tuberculosis with my tuberculin. The following is an account of the cases according to a summary given by Dr. Dor:—

Three cases of parenchymatous keratitis were completely cured. One case of serous iritis of very chronic character, with disturbance of the vitreous, was improved, and treatment was to be continued. The fifth case was that of a girl with healed pulmonary tuberculosis, who had iritis, with adhesions, which had failed to yield to a three months' course of atropine. Under tuberculin treatment the iritis healed without iridectomy, and the adhesions separated one after another. There still remains a little sclerotitis. The patient gained over 15 lbs. in weight, and no longer suffers from headache, to which she was subject for several years previously. The visual acuity—although never less than 0·4—is now 0·6. The sixth case was that of a female patient who, in addition to tuberculous iritis with evident tuberculous nodules, suffered from double detachment of the retina. Under treatment the nodules disappeared, and the retinal detachment was cured completely in one eye, and almost completely in the other. The patient's general condition likewise improved considerably. Case 7 was one of episcleritis of two months' standing, which disappeared in eight days. The last case was that of a girl with retinal detachment, which was cured.

I have cited Dr. Dor's observations because tuberculin therapy, although destined to render valuable service in the treatment of ocular tuberculosis, is still regarded by oculists with some reserve. In tuberculosis of the eye, tuberculin should be employed hypodermically, as for internal tuberculosis. Beginning with 1/10 c.c. of Tbk5, progress may be more rapid, *i.e.* the dose may be increased by 1/10 c.c., care being taken to avoid reactions.

To summarise shortly. My tuberculin is not an antituberculous serum. It contains no antibodies.

It contains tuberculous exotoxins and endotoxins, which, in proper dose, act as a vaccine, strengthening the bacteriolytic power of the body's protective cells against the tubercle bacillus, and stimulating the protective cells to produce antibodies to neutralise the toxins secreted *in vivo* by the bacillus.

In addition to its function as a vaccine, my tuberculin exercises a bactericidal, or, at least, attenuating, effect on the tubercle bacillus. This effect depends especially on the orthophosphoric extract (endotoxins) which enters into the composition of the tuberculin.

In the treatment of internal tuberculosis and of surgical tuberculosis, accompanied by pulmonary or renal lesions, where the vaccine value of the tuberculin alone is available, the method is that of hypodermic injection with dosage graduated so as to avoid reactions, and not to exceed the optimum dose which corresponds to the maximum curative effect.

In surgical tuberculosis where foci are few in number and limited, the better method is that of intra-focal inoculation, which allows the bactericidal or attenuating properties of the tuberculin to have play, and also an action apparently favourable to sclerosis of tuberculous tissues.

MALIGNANT DISEASE OF THE COLON ASSOCIATED WITH ABSCESS SIMULATING APPENDICITIS.

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I HAVE previously drawn attention to the way in which malignant bowel growths may simulate appendicitis,[1] and in a paper in the *Lancet* for 16th September 1905, on "A Case of Tuberculous Ulceration of the Colon Simulating Appendicitis," I summarised these several ways as follows:—

"1. A growth in the cæcum may be associated with attacks like appendicitis. These attacks may be due to obstruction or to inflammation of the parts around, and this may go on to the formation of an abscess which may exactly simulate one due to appendicitis.

"2. A growth in any part of the large intestine beyond the cæcum may get blocked, and, if there is a competent ileo-cæcal valve, the cæcum is the first part to feel the stress of the obstruction, and at first all the pain is referred to this region. It is only as the attack passes off that the falling distension enables the lump elsewhere to be felt.

"3. Primary malignant disease of the appendix may be the cause of the symptoms."

Since that time a specimen of carcinoma of the cæcum has come under my notice, which suggests at least one of the ways in which an abscess may form about such a growth. The patient from whom the growth was removed was a man of 49. His symptoms were entirely obstructive, and there was nothing to suggest that he had ever had an inflammatory attack. On examining the removed cæcum I found that the growth completely surrounded and obstructed the orifice of the appendix, and that the remainder of the organ was distended with pus from which a pure culture of an organism very similar to the bacillus coli, if not identical with it, was obtained. It is easy to see how such a condition might give rise to an abscess resulting from a perforation of the appendix, but really secondary to the presence of the growth in the bowel.

Often the diagnosis is not made before opening the abdomen, and I am afraid usually from want of care in the consideration of the history, for in those cases that are recorded in this paper,

and in the others that have come under my notice, the previous history has been suggestive of the condition found, but it is often not obtained until the unexpected findings at the operation prompt a careful analysis of the early symptoms. A diagnosis of appendicitis is usually so well founded as to make error excusable, but it may be none the less unfortunate, as the condition under consideration may demand a very extensive operation, for which one may not be prepared unless forewarned, and, indeed, even at the operation the condition underlying the presence of the abscess may be easily missed unless suspected.

The patient invariably dates the illness from a recent attack, but a careful cross-questioning will usually elucidate a history of a long period of general ill-health with colicky abdominal pain, much rumbling with irregularity of the bowels, and perhaps the passage of mucus and traces of blood.

I cannot say that the age of the patient is anything more than suggestive, for I have seen malignant disease of the bowel give rise to the suspicion of appendicitis in patients of only 23 and 31 years of age; and, on the other hand, I have operated on six cases of appendix abscess in patients whose ages varied from 45 to 67, a period at which carcinoma is common.

A hard mass in the cæcal region would undoubtedly raise the suspicion of cancer in the elderly, as it would of tubercle in younger subjects, but I have several times diagnosed the one or the other when nothing more than an acute infection has been the explanation. The most suggestive feature is undoubtedly the presence of such a mass at the *outset* of the attack, especially if it gets larger without much pain, and if it is associated with evidence of intestinal obstruction.

When a cæcal growth is associated with an abscess the treatment becomes a matter of difficulty. On most occasions the abscess is merely drained, perhaps even in ignorance of the presence of the growth. As a rule this gives immediate relief, though it is but temporary, for a fæcal fistula is very likely to form, while the onset of intestinal obstruction may add to the patient's misery. In two cases of this kind, in which drainage only was employed, the patients died on the seventh and ninth days respectively.

To endeavour to anticipate the onset of such distressing complications, I determined to make a short circuit in the next case which presented itself, and the notes which follow illustrate my efforts.

Malignant Growth in Ascending Colon with Retrocolic Abscess

simulating Appendicitis—Short-Circuiting—Drainage.—The patient was a man of 50, admitted to the Newcastle Infirmary in October 1905, complaining of pain in the right iliac fossa, with stiffness of the right leg. During the whole summer he had now-and-again some soreness in the iliac fossa, and had lost flesh and strength. There was also constipation with rumbling in the bowels, but no sudden attacks of pain and no vomiting. He dated his present illness to 5 or 6 weeks before admission, when he began to suffer from pain in the right iliac fossa and down the leg—the pain was not severe enough to make him lie up, and he never vomited. Three weeks before admission the pain got so bad that it prevented him sleeping, and he was bound to give up work. He began to be troubled with some looseness of the bowels, and once or twice noticed blood in the motions, and it was about this time that he first became fevered, and his doctor advised him to poultice the side. About two weeks before admission the right leg became flexed, and during the week preceding admission the temperature varied between 99° and 101°. There was no history of any previous abdominal illness.

On admission the patient looked thin and ill, the temperature was 100° and the pulse 120, while the tongue was coated and moist. He lay in bed with his leg drawn up to an angle of 45 degrees. In the right iliac fossa, and extending into the corresponding loin, there was a large, very tender mass, but nothing could be made out elsewhere in the abdomen or on pelvic examination. A diagnosis of retrocolic appendix abscess was made.

On October 17th I opened the abdomen by an oblique muscle-cutting incision about 6 inches long in the right iliac fossa, as for appendix abscess. On opening the peritoneum the appendix was found to be normal, but there was a malignant growth in the commencement of the ascending colon and a large inflammatory mass in the position of the psoas muscle and extending down into the right iliac fossa behind the peritoneum. It did not appear a suitable case for excision even had the patient's condition warranted the attempt. In the hope of avoiding a fæcal fistula or the onset of obstruction, I made an anastomosis between the ileum and the transverse colon. The small intestine was divided about a foot above the ileo-cæcal valve; the lower end was closed and the upper implanted into the transverse colon, the anastomosis being made with the Murphy button. The front part of the incision was then closed, and the abscess opened

Carcinoma of the ascending colon involving the ileo-cæcal valve. There was an intraperitoneal abscess behind the growth leading to the simulation of appendicitis. The bowel as shown in the illustration was successfully removed from a woman of 54.

posteriorly by working in the retroperitoneal tissue behind the colon, and, by this means, fully half-a-pint of very foul pus was evacuated. The patient was a good deal collapsed after the operation, but soon picked up, and made a good immediate recovery. At the end of a fornight the button was passed per rectum, and in another week he was able to travel a distance of 40 miles to his home. When he left the hospital he had no pain, he took food well, and the bowels were regular. The mass was much less but stony hard, and there was still a free discharge of pus. This patient gradually became exhausted, and died three months after leaving hospital. There was always a discharge of pus, but the operation certainly spared him both the inconvenience of a faecal fistula and the pain and danger of intestinal obstruction.

It is quite obvious, however, that if circumstances are favourable the best thing for the patient would be to remove the growth even as a palliative measure, and in the following case I was able to carry this out.

Malignant Growth of the Ascending Colon associated with Abscess simulating Appendicitis—Resection—Drainage.—This patient was a woman of 54, who came to the hospital complaining of pain in the right side of the abdomen, which she attributed to a small femoral hernia. The pain came on suddenly two weeks before she applied for admission, but it was not very severe, and did not make her vomit, though she felt very ill and had no appetite. The bowels were confined in spite of opening medicine. On closer enquiry, prompted by the disclosures of the operation, the patient admitted that for months she had not been well, being much troubled with rumblings in the abdomen which made her "stomach swell up with wind." The bowels only moved every two days, but she never had diarrhoea, nor was there blood in the stools. She did not take food well.

On admission she looked a healthy old woman. The temperature was 99·4 , and the pulse 108. The tongue was furred, but moist. The abdomen was neither distended nor rigid, but in the right iliac fossa, just internal to the anterior superior spine, there was a very hard mass about half the size of the patient's fist, and extremely tender. It felt as if close under the abdominal wall, but was deeply fixed.

A diagnosis of appendix abscess was made, and operation decided upon. I made an oblique muscle-cutting incision in the right iliac fossa, which was subsequently enlarged so as to extend from the outer border of the rectus in front to the right flank behind. The

parietal peritoneum was not adherent, but the sulcus on the outer side of the cæcum was glued up by inflammatory material, and, on separating this, a foul abscess was opened, two or three ounces of pus escaping. The appendix was found with difficulty being closely adherent behind the outer edge of the cæcum—it was separated and removed. On attempting to tuck in the stump with a purse-string suture, I found the wall of the bowel so rigid that I could not invert it. This confirmed my original suspicion, and at this stage I enlarged the incision forwards, and explored the cæcum with a couple of fingers in the peritoneal cavity. I found a new growth occupying the bowel, with a large mass of glands in the mesentery. The involved bowel and the glands were brought outside, and I found that, though extensive, it was possible to remove it, for there were no deposits in the liver or peritoneum. The posterior part of the cæcum, the lowest part of the mesentery, and the last inch or two of the ileum, formed part of the abscess wall, and enough bowel had to be removed to get wide of the infected area, as well as to remove the mass of involved glands with the area of probable lymphatic invasion.

As it subsequently turned out when the specimen came to be examined, the ileum was divided about two feet from the cæcum; its end was ligatured and inverted, and a lateral anastomosis made by direct suture between it and the transverse colon. The mesentery was then dealt with, being divided right up to the origin of the ileo-colic artery;[2] and although the glands were enlarged up to the highest point, one lying on the duodenum, all appeared to have been removed. As a last step, the transverse colon was divided just beyond the hepatic flexure, its extremity being ligatured and the stump inverted. A drain of gutta-percha tissue was brought from the remaining part of the abscess cavity out of the posterior end of the incision. The abdominal wound was closed in layers with catgut, silkworm-gut being used for the skin.

The patient stood the operation well, and made a good recovery, except for a mild attack of cystitis. She was sufficiently recovered to leave the hospital on the twenty-fourth day. The drain was removed on the fifth day, and the sutures at the end of a fortnight. Except for the drainage-tube area, from which there was very little discharge, the wound healed throughout by first intention, the temperature only once or twice reaching 100°. By the twenty-fourth day the patient was sufficiently recovered to leave the hospital, and when I saw her three months after the operation she

was looking exceedingly well, and had gained weight considerably. The bowels were regular, she had none of her old symptoms, there were no signs of recurrence, and the scar was sound.

The drawing gives a very good idea of the growth, which was really a constricting carcinoma surrounding the bowel just at the level of the ileo-cæcal junction, both segments of which were involved. There had evidently been a good deal of obstruction at the valve, for the lower few inches of the ileum were considerably hypertrophied, and in this part of the bowel there was quite a collection of potato skins, fruit seeds, &c. The cæcal wall was much hypertrophied, and, as the mouth of the appendix was unobstructed, it is most probable that the appendix would be distended by the contents of the cæcum. An examination of the posterior surface of the specimen showed that the abscess cavity lay behind in the ileo-cæcal angle, its walls being formed by the cæcum, the mesentery, and the last few inches of the ileum, while it lay on the peritoneum of the iliac fossa. The extent of the glandular involvement is not apparent in the drawing, but it formed a considerable part of the mass felt at the operation. The ileum removed measured 23 inches and the colon 10. Microscopically, Dr. Stuart M'Donald reports the growth to be a columnar-celled carcinoma.

To my great chagrin the appendix was mislaid before I had an opportunity of examining it, so that whether the abscess really arose from a lesion in the appendix or by an extension from the cæcum, I am unable to say, though there is no demonstrable perforation in the growth which might have communicated with the abscess cavity, while, on the other hand, the appendix lay in it.

In this patient there were so many enlarged glands that I fear the whole disease was not removed, but the operation gave the patient the greatest amount of relief, with the possibility of freedom for a considerable time. I had hoped that a good many of the glands might be merely inflammatory, but they all appeared to be infiltrated with growth when submitted to more careful examination.

To some it may appear to be tempting Providence to freely open the peritoneum and resect bowel in the presence of an intraperitoneal abscess, but for several years I have operated on appendix abscesses by the method of Mr. Rutherford Morison,[3] and I know that the peritoneum can be safely opened and packed off just before evacuating a stinking appendix abscess. I have

operated altogether on 300 cases of appendicitis,* and of these 93 were localised abscesses which accounted for 3 deaths, two due to acetonuria and one to an undiscovered secondary abscess. In no case have I seen infection of the peritoneum arise. Last year I opened a large appendix abscess in a little boy of 4, and, in endeavouring to find the appendix, the ileum was so much torn that I had to enlarge the opening into the peritoneum, resect a foot of intestine, and make a lateral anastomosis, but, in spite of this, there was never a symptom of peritoneal involvement, and the boy made an uninterrupted recovery.

In conducting these operations it is of the greatest importance to open the peritoneum sufficiently freely to enable one to reach healthy intestine for the resection and anastomosis, and it may be said that the risk is lessened by the magnitude of the procedure.

I have always employed the oblique muscle-cutting incision of Rutherford Morison, for it gives ready access, and the abscess can be packed off posteriorly and the remainder of the operation conducted from the anterior part of the wound. At the conclusion of the operation the drain can be most conveniently brought out behind, for in this position gravity comes to our aid and there is much less risk of hernia.

An enquiry into the after-history of a consecutive series of 41 of my cases operated on by this method for appendix abscess resulted in replies being obtained from 34 without any complaint of hernia or weak scar, though none of the cases had been operated upon less than two years and several as long as eight and seven years, while most followed the laborious occupations common in this district.

I lay great stress on ample provision for drainage by tube or gutta-percha tissue, but not by gauze, which soon acts as a plug or becomes so incorporated with the tissues as to make its removal excessively painful, while, if in proximity to the anastomosis, it may interfere with union or tear it away when removed.

In another case, if it were not possible to excise the growth

* Group	I.	Acute Appendicitis without Peritonitis	. . .	18	cases with	0	death
„	II.	„ „ with local Peritonitis	. . .	46	„ „	1	„
„	III.	„ „ with flank or pelvic Peritonitis	.	41	„ „	1	„
„	IV.	„ „ with Diffuse Peritonitis	. .	20	„ „	13	deaths
„	V.	„ „ with Residual Abscesses	. .	20	„ „	2	„
„	VI.	„ „ with primary Localised Abscess	.	93	„ „	3	„
„	VII.	Interval Appendicitis	. . . . .	58	„ „	0	„
„	VIII.	Appendicitis with primary Complications	. .	4	„ „	2	„
			Totals	300	„ „	22	„

I should certainly make an anastomosis as in the first patient, but I would draw attention to the necessity of cutting across the bowel leading to the growth, and not relying on a lateral anastomosis alone, for it seldom succeeds in diverting the intestinal current. This has been abundantly proved in many cases that have come under my notice, and I especially remember one in which a lateral anastomosis was made between the ileum and the transverse colon for the cure of a faecal fistula associated with a tuberculous caecum. A catgut ligature buried with Lemberts of silk was tied round the ileum between the anastomosis and the caecum, with the result that there was no leak for seven days, but, at the end of that time, the fistula began to discharge as freely as before, necessitating further measures to bring about cure.

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CYTOLOGICAL EXAMINATION OF THE DISCHARGE IN CASES OF SUPPURATION IN THE MAXILLARY SINUS AS A GUIDE TO TREATMENT.

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At the meeting of the British Medical Association held at Exeter in 1907, Dr. William Milligan called attention to the value of the cytological examination of aural discharges in assisting in the estimation of the extent of the pathological changes in the middle ear. His conclusions were, shortly, that if the discharge showed on examination large numbers of leucocytes associated with degenerated columnar epithelial cells, and with few lymphocytes, the inflammatory process had not passed deeply into the lining membrane of the middle ear. The presence, on the other hand, of large numbers of lymphocytes indicated, he found, granulomatous changes; while myelocytes suggested involvement of the bone, and giant cells the existence of tuberculous disease.

In the case of suppuration in the maxillary sinus, the question of radical or non-radical treatment is at present, as a rule, settled on the basis of the duration of the disease. This is practically the only guide available, and it has proved by no means satisfactory. If from cytological examination of the discharge one were able to derive some information as to the condition of the lining membrane of the cavity, such information would be of the greatest value in assisting us in the choice of operative procedure.

It should be borne in mind that, in contrast to the middle ear cleft, the size and shape of the maxillary antrum render it much more liable to exhibit varying degrees of inflammatory change in different parts of its lining membrane. Thus, for example, it not infrequently happens that in the same antrum one may find advanced changes in the mucous membrane of the alveolar region with little or no disease in the mucosa lining the roof. This fact must render less definite any information which might be derived from cytological examination of the discharge.

With a view to investigating the help to be obtained from cytology, the discharges in a number of cases of maxillary sinus suppuration occurring in the Ear, Nose and Throat Department, under the care of Dr. Logan Turner in the Royal Infirmary, Edinburgh, have been examined before treatment and the subsequent

progress of the cases noted. The results of the investigation are detailed in this paper.

The specimens were, as a rule, obtained by puncture through the outer wall of the inferior meatus and by washing out the cavity after a thorough cleansing of the nasal chambers, so as to avoid contamination as far as possible. In a few cases the specimen was collected on a swab at the operation. Films of the discharge were made in the ordinary way and stained with Leishman's or Jenner's stain. Great difficulty was often experienced in recognising the different varieties of cells owing to the extreme degree of degeneration, but examination of a second specimen collected shortly after the first usually proved more satisfactory. Neither giant cells nor myelocytes were found in any of the films. Epithelium, polymorphonuclear pus cells and lymphocytes were practically the only types of cell recognised. Lymphocytes were regarded as being present in excess when the ratio of lymphocytes to polymorphonuclears was greater than one to six or eight.

Relation of Pathological Histology to Cytology.—In order to ascertain the structural changes in an inflammatory condition of the antral mucosa for purposes of comparison with the cells in the discharge, a microscopic examination was made of the mucosa in six cases where the discharge had been cytologically examined and the radical operation subsequently performed. Only two of the specimens will be described in detail.

1. D. B., a case of dental origin and of many years' standing, associated with atrophic rhinitis. Cytological examination of the discharge revealed the presence of large numbers of lymphocytes and epithelium of the columnar and squamous types. The streptococcus pyogenes was the pathogenic organism. The mucosa was found to be much thickened. In section, the epithelium was shown to be mostly ciliated but squamous in parts, with a slight, small-celled infiltration of the deeper layers.

2. R. D., a dental case of three years' duration. The discharge showed simply polymorphonuclear pus cells with very few lymphocytes. The streptococcus pyogenes was pathogenic. The mucosa was œdematous, and showed on section the epithelium for the most part preserved and ciliated but squamous in a few places. There was dense, small-celled infiltration of the submucous connective tissue, especially the superficial layers. Numbers of cells could be seen making their way out between the epithelial cells. These were mainly lymphocytes, although in the secretion on the surface the cells were almost entirely polymorphonuclear.

The mucosa in the other four cases showed similar changes, and bore out conclusively the statement made above that different parts of the cavity often show different degrees of inflammatory change.

Cytology in Relation to Duration of the Disease.—The duration of the disease was ascertained in sixty-nine of the eighty cases examined. These are grouped below under four periods of duration, viz. first, over five years; second, less than five years and more than one; third, less than one year and more than six months; fourth, less than six months.

1. Twenty-nine cases were of more than five years' duration. In ten of these (34 per cent.) lymphocytes were found in excess. Epithelium occurred in sixteen (55 per cent.)—ciliated in one, columnar in three, squamous in ten, and both columnar and squamous in two.

2. Twenty-two cases belonged to the next period—under five years and more than one year. Six of these (27 per cent.) showed excess of lymphocytes, and five (23 per cent.) epithelium, which was squamous in four cases and both columnar and squamous in one case.

3. In seven cases the discharge had lasted less than one year and more than six months. Excess of lymphocytes was found in three of these (43 per cent.). Squamous epithelium occurred in one (14 per cent.).

4. Eleven cases were cases of less than six months' duration. Excess of lymphocytes was shown in four (36 per cent.). Epithelium was recognised in none of the eleven.

It would seem, then, firstly, that the percentage of cases in which excess of lymphocytes occurs does not vary very greatly over these periods (34 per cent., 27 per cent., 43 per cent., 36 per cent.), and that the presence or absence of relatively large numbers of lymphocytes in the discharge from any case does not permit us to relegate the case to any particular period of duration. Secondly, the more chronic the case, the greater the likelihood of finding epithelium in the discharge.

Cytology as Affecting Choice of Operative Procedure.—Sixty-five cases were treated by operative intervention. In some, measures short of radical were employed, consisting of lavage through a permanent opening, made either in the alveolus or in the nasal wall, or lavage by frequent puncture of the nasal wall with trocar and cannula without establishing a permanent opening. In others a radical operation was performed, the cavity being curetted

through an opening in the canine fossa, and a permanent communication being made between the antrum and the inferior meatus of the nose.

The question of the choice of operative procedure will be dealt with as affected, firstly, by the presence of small or large numbers of lymphocytes; and, secondly, by the occurrence of epithelium in the discharge.

1. (*a*) In forty of the cases only small numbers of lymphocytes were found. In thirty-two non-radical measures were employed, and in sixteen (50 per cent.) a cure resulted. Four out of fourteen (28 per cent.) treated by lavage through an alveolar opening, and eight out of thirteen (61 per cent.) treated by lavage through a nasal opening, were cured. Repeated intra-nasal puncture and washing out was carried out in five cases, and was successful in four (80 per cent.).

In the remaining eight cases the radical operation was performed.

(*b*) Twenty-five of the cases showed large numbers of lymphocytes. Of the eighteen treated by non-radical measures, six (33 per cent.) were cured. Two were treated by alveolar lavage without success, though one of them was only of three weeks' duration. Lavage through a permanent nasal opening was carried out in twelve cases, of which three (25 per cent.) were cured. Of three cases treated by repeated intra-nasal puncture, two (66 per cent.) were cured. One case cleared up after the removal of some carious teeth.

The radical operation was performed in seven of the twenty-five cases.

It is worthy of note that excess of lymphocytes was found in five out of six cases where the sinus trouble was associated with atrophic rhinitis.

2. In twenty of the cases which underwent operative treatment, epithelium was found in the discharge.

(*a*) One case which showed ciliated epithelium (a case of six years' standing, in which were found only small numbers of lymphocytes) was cured by lavage through a nasal opening.

(*b*) One case in which columnar epithelium was found (a case of many years' duration, in which large numbers of lymphocytes were present) was uncured by alveolar lavage.

(*c*) Of two cases which showed both columnar and squamous epithelium, one was treated by radical measures and the other was cured by the alveolar operation.

(*d*) Squamous epithelium only occurred in sixteen cases. In fourteen of these non-radical measures were employed, five (36 per cent.) being cured, one out of five (20 per cent.) by the alveolar route, three out of eight (37 per cent.) by permanent nasal opening, and one by repeated intra-nasal puncture.

The above results for ease of comparison are shown below in tabular form.

	Non-radical Treatment.		Alveolar Lavage.		Nasal Lavage.		Frequent Intra-nasal Puncture.	
	Total.	Cured.	Total.	Cured.	Total.	Cured.	Total.	Cured.
		Per cent.		Per cent.		Per cent.		Per cent.
1. (*a*) Lymphocytes not in excess . . .	32	50	14	28	13	61	5	80
(*b*) Lymphocytes in excess . . .	18	33	2	...	12	25	3	66
2. (*a*) Epithelium ciliated	1	100	...	...	1	100	...	...
(*b*) Epithelium columnar . . .	1	...	1	...	...	...	...	...
(*c*) Epithelium columnar and squamous	1	100	1	100	...	...	...	...
(*d*) Epithelium squamous . . .	14	36	5	20	8	37	1	100

With regard to groups 1 (*a*) and 1 (*b*) in the table, it will be remembered that the cases in the two groups were distributed in similar proportions over the different periods of duration, so that, in comparing these results in the two groups, the duration factor may probably be neglected. It would seem then that the prospect of cure by non-radical measures is greater in cases where only small numbers of lymphocytes are present than in cases where lymphocytes are present in large numbers.

With regard to group 2, the number of cases showing ciliated and columnar epithelium was too small to enable one to come to any conclusion as to the significance of the different varieties of epithelium. It will be noted that seventeen cases showing epithelium were treated by measures short of radical, and that seven of these (41 per cent.) were cured. It will also be noted that of the total sixty-five cases, fifty received non-radical treatment, with twenty-two cures (44 per cent.). Apparently, then, the presence of epithelium in the discharge has very little bearing on the prospect of cure by non-radical measures, despite the fact,

be it remembered, that the duration of cases showing epithelium is greater than the average.

Cytology in Relation to Bacteriology.—The bacteriology was noted in thirty-five cases where there was no excess of lymphocytes. The streptococcus pyogenes was present in sixteen of these. Of the sixteen, thirteen were treated by non-radical measures, with seven cures (53 per cent.).

Of the cases where excess of lymphocytes was found, the bacteriology was investigated in eighteen, thirteen of which were found to be associated with streptococcus pyogenes. In eight of these latter, non-radical measures were employed, and one was cured (12 per cent.).

It would seem, then, that the presence of streptococci in a case showing few lymphocytes does not appreciably affect the prospects of cure by non-radical measures (53 per cent. as compared with 50 per cent.; *vide* table). In the case, however, which shows large numbers of lymphocytes, the prospect of cure is considerably diminished by the presence of streptococci (12 per cent. as compared with 33 per cent.).

Conclusions.—1. The discharge from the maxillary sinus is a discharge from a mucous membrane which is showing different stages of the inflammatory process in different parts of its area. Cytology, therefore, can never be more than a partial aid in the estimation of its condition.

2. The presence or absence of relatively large numbers of lymphocytes in the discharge does not depend upon the chronicity of the disease. Epithelium is not, as a rule, to be recognised in the early stages of the disease. Epithelium found in the discharge is usually of the squamous variety.

3. Cases in which the discharge shows relatively small numbers of lymphocytes hold out a better prospect of cure by non-radical procedure than do those where relatively large numbers of lymphocytes occur.

4. Independent of the period of duration, cases which are associated with the streptococcus pyogenes and which also show excess of lymphocytes in the discharge are seldom cured by non-radical measures.

I have to acknowledge my indebtedness to Dr. Logan Turner for the clinical material which he has placed at my disposal for the purposes of this investigation, and for many valuable suggestions in carrying it out.

NOTE ON THE USE OF THE SCOPOLAMINE-MORPHINE COMBINATION AS AN ANÆSTHETIC ADJUNCT.

By H. TORRANCE THOMSON, M.D.,
and
DENIS COTTERILL, M.B., Ch.B.

THE combination of scopolamine and morphine has been largely used on the Continent, especially in Germany, and, to a limited extent, in this country and America, as an anæsthetic adjunct.

As the reports regarding its use were so satisfactory, it seemed to us desirable to submit the method to the test of experience, and the following brief record is based on a series of cases conducted under our supervision[1]:—

The work has been carried out in Mr. Cotterill's wards in the Royal Infirmary, and we have to thank him for his kindness in giving us the opportunity of conducting the investigation.

Two different methods were tried.

1. The administration, two hours previous to operation, of $\frac{1}{64}$th gr. (1 milligramme) of scopolamine bromohydrate with $\frac{1}{6}$th gr. of morphia sulphate. In the greater number of the 34 cases in which this method was tried, induction of anæsthesia was by chloroform, the anæsthesia being maintained, where and so far as necessary, by ether given by the open method.

This method of procedure was strongly recommended by Drs. Rouffart and Wâlravens of Brussels at the International Surgical Congress, 1908. They had used it in over 1000 cases, chloroform being the general anæsthetic, and they claimed for it (*a*) an easy induction of narcosis; (*b*) that patients slept for a considerable time afterwards; (*c*) that vomiting was rare, either during or after the operation; (*d*) that the amount of chloroform required was small.

2. The second method tried was as follows:—Three preliminary doses of the scopolamine-morphine combination were given at intervals, the first dose $2\frac{1}{2}$ hours, the second $1\frac{1}{2}$ hours, and the third $\frac{1}{2}$ hour, before the operation. From $\frac{1}{120}$th gr. to $\frac{1}{100}$th gr. of scopolamine with $\frac{1}{8}$th gr. morphine was the usual

[1] Since this paper was prepared, Mr. Leedham-Green of Birmingham has read a paper at the Belfast Meeting of the British Medical Association, an abstract of which appeared in the *British Medical Journal* for 2nd October 1909.

amount of each dose. This method was suggested by the perusal of an abstract of a paper read before the Edinburgh Medical Women's Club by Dr. Bertha van Husen, in which she quotes from an experience of over 1000 cases.

The effects of the drugs used in these two ways differ only in degree, being more pronounced where three preliminary doses are given.

In our series of cases no attempt has been made to dispense altogether with the general anæsthetic. Thus far we have practically confined ourselves to these two methods, and, in the meantime, can draw upon an experience of about 180 cases.

The advantage of the combination of scopolamine and morphine is, roughly speaking, based upon the fact that the hypnotic and anæsthetic properties of these two alkaloids associate themselves, whilst their toxic effects counterbalance each other to some extent.

It has been stated that the drugs, when kept mixed, become uncertain in their effects. It is well, therefore, as a rule, to keep the two solutions separate, and mix them at the time of administration. In hospital work, if the drugs are being given freely, time and trouble are saved by having the solutions made up together in small quantity.

The patient is prepared in the usual way for an anæsthetic. It is important to remove false teeth before the soporific effect of the drugs has time to manifest itself, otherwise the patient has to be disturbed, and difficulty may be experienced in rousing him sufficiently to enable the teeth to be removed. The drugs, in our cases, were injected hypodermically into the arm, as this necessitates less disturbance of the patient than injection into any other part.

After the comparatively large dose of $\frac{1}{4}$th gr. scopolamine, a few of the patients complained of temporary giddiness, but this only in the short interval before they went to sleep, which they did in most cases in from ten minutes to a quarter of an hour. When the three doses were given there was no complaint of giddiness, though the total amount of the drugs given was larger than in the case of the single dose.

After the first dose the patient, as a rule, soon goes to sleep, and generally the third injection can be given without waking the patient. More usually, when a patient has to be lifted on to a trolley and taken to the ante-room of the operating theatre, he partially wakens up, but if left quiet very soon falls asleep again, and,

in many cases, will have no recollection of having been moved from bed. Where possible, however, it would be a distinct advantage to administer a small dose of chloroform before the patient is lifted out of bed. If the vapour is somewhat gradually introduced the patient will probably not waken at all. Where a strong vapour is administered to commence with, the patient will almost certainly waken and resist.

In the great majority of cases considerably less anæsthetic was required to get the patient sufficiently under than is usual where the drug has not been given. What one desires is to produce a degree of narcosis deep enough to prevent active resentment on the part of the patient when a skin incision is made. Were it not that general feeling is against restraint in the shape of straps to hold down the arms and legs, one would be tempted to apply these, as the patient often momentarily draws up his legs or arms in a merely reflex way in response to some special stimulation—as, for instance, a skin incision or traction on the spermatic cord or parietal peritoneum. As an illustration of this point we might quote the case of an old woman who was operated on for scirrhus of the breast. It was not deemed advisable to give her a general anæsthetic, so after her preliminary dosage with scopolamine she was operated on under local anæsthesia. The incision had to be extended considerably beyond the anæsthetic area; the patient actively resisted the incision being made, but lay perfectly quiet while the breast was being dissected off, and when questioned, even the following day, had no idea that she had had her operation done. While mentioning this case, it is worthy of note that the patient did not apparently suffer in the slightest degree from shock, though she was a very frail old woman of about seventy.

When a patient does move during an operation, a very few whiffs of an anæsthetic suffice to quiet him, pointing to the probability that the movements are reflex rather than what one might call conscious. In our series of cases, what we have usually done is to put the patient fairly well under chloroform, and after the skin incision has been made, to remove the mask, and only reapply it on some indication being given of the patient "coming out."

Actions prone to disturb the patient are skin incisions, traction on the stomach, parietal peritoneum, or spermatic cord, or moving the patient about much.

In abdominal operations, at least at certain stages, it will be found necessary to give a more or less continuous application of

chloroform or ether in order to obtain total relaxation of the muscles of the abdominal wall.

At first it is somewhat difficult to be certain whether the patient is sufficiently "under" to permit of an incision being made without eliciting active resentment, or whether the patient is merely asleep. With a little experience this difficulty is, to a large extent, overcome. The corneal reflex is often absent at an early stage of the narcosis, so that it is wise not to lay too much stress on this sign. As a general rule, at any rate in over 60 per cent. of the cases, the pupil, previous to the application of the chloroform mask, was moderately dilated, but it contracted as in normal anæsthesia, as the narcosis deepened. The breathing tended, after the administration of scopolamine and morphine, to slow down somewhat, but not markedly so, except in a few cases where the rate was as slow as eight respirations per minute. (In one case they fell to six per minute.) On the application of the chloroform vapour the breathing usually becomes slightly irregular and more rapid, but quiets down as the narcosis deepens, resembling that of natural sleep.

From reports on the subject we were prepared to find, as a result of the administration of the drugs, that the respirations would fall to a considerably lower rate than they actually did in the majority of our cases. In those cases in which the respirations did fall to a rate of twelve or lower, the patients maintained a perfectly good colour and seemed in no way embarrassed, the act of breathing being just as in normal sleep, and not laboured or particularly deep.

The temperature is apparently unaffected.

The tendency is for the pulse-rate to fall, and for the tension to remain about the same, or, if anything, to be slightly raised. If the pulse-rate be taken when the patient is disturbed, as in being moved to the operating theatre, it will be found to have mounted up—often to over a hundred per minute—where before it had been at about sixty or seventy, but as the patient quiets down it soon falls to its original rate or lower. We have not, in our series of cases, met with any case in which any undesirable effect took place on the circulation. In this connection it may be interesting to note that one of us was called upon to administer an anæsthetic to a patient on the seventh day of an attack of lobar pneumonia; $\frac{1}{64}$th gr. of scopolamine with $\frac{1}{8}$th gr. of morphine was administered two hours previous to the giving of the anæsthetic. Chloroform was used, and only a small preliminary inhalation

was necessary. There was no noticeable effect on either pulse or respiration. The pulse was strong and regular, about ninety per minute, and the respirations about thirty. The patient stood the small operation—clearing out the uterus—perfectly satisfactorily, and had her crisis on the following day.

The combination has been used in several very frail old men and women, with results in every way satisfactory as regards the anæsthetic.

Sickness. — Our results as regards sickness have been very encouraging. In our whole series we have not had one case in which sickness was in any way troublesome. There has been no case of vomiting on the operating table. Occasionally a patient has retched slightly, but this in an extremely small proportion of cases, eight at most.

After-sickness, also, has been conspicuous by its absence. The worst cases we have had have been those in which the patients have vomited three or four times during the evening and night following the operation. The total number of these cases does not exceed half a dozen. In from thirty to forty cases the patients, in the evening, brought up one or two mouthfuls of fluid, but had no retching or nausea, and were perfectly comfortable immediately afterwards. The sickness in these latter cases may have been due to the fact that in many instances the patients, on waking up after the operation, complained of thirst or dryness of the mouth, consequent on the administration of the drugs, and were allowed to drink water fairly freely.

One hesitates to be too dogmatic, considering our small number of cases, but we have been much struck with the absence of nausea, retching and vomiting, either during or after operation, and the staff sister and nurses are very decided in their opinion that the afternoons and evenings of operation days are very much quieter than in the days before scopolamine and morphine were used as a routine measure.

Effects of the Drugs on Different Patients.—This drug or combination of drugs conforms to the usual rule of drugs in that the effect varies within limits, with different patients. Roughly speaking, we have found that old frail patients, patients of the spare type, and those mentally calm responded more markedly as a rule, while stout, plethoric persons, alcoholics and nervous persons, required, other things being equal, larger doses.

We have not, so far, given the method a trial in patients under sixteen, but from the cases we have had at about this age we feel inclined to extend our investigations to younger patients.

As a rule, the action of the drugs is at a height about two hours after administration, and the effects last about five to six hours.

We have not been able to note any bad effects from the combination, and except in cases in which it is important that the patient should waken up soon after the operation in order to clear the mouth and throat of blood, &c., one has difficulty in suggesting any contra-indications to its use.

For the induction of anæsthesia we have found chloroform the more satisfactory, on account of its vapour being less irritating than that of ether. Even when patients are apparently sound asleep they nearly always cough and choke when ether is applied, and this, of course, tends to rouse them. When chloroform is carefully given, and circumstances are propitious, it is, as a rule, fairly easy to get the patient under without waking him.

When the anæsthetic has to be continued during the operation there is no difficulty in keeping the patient satisfactorily under with a comparatively small amount of ether given on an ordinary Schimmelbusch mask.

Summary of Conclusions.—We would suggest, as the result of these observations, that we are justified in drawing the following conclusions:—

1. That as the result of giving either the single or the three preliminary doses, one does away with fear as a source of danger in the performance of an operation. There can be no doubt that the condition caused by fear is one which predisposes a patient to sudden syncope, which is accountable, at least to a very considerable extent, for the cases of sudden death which form so large a proportion of the casualties which take place during the administration of chloroform. We desire to lay emphasis on this point, as we consider it one of the greatest importance. As mentioned before, if due care be taken it is possible in the majority of cases to administer the anæsthetic without the patient waking from sleep. Even in hospital, where the conditions could not be the most favourable as regards quiet, a large percentage of the patients had no recollection afterwards of having been removed from the ward.

2. That the amount of anæsthetic required is small. This is undoubtedly true, and, of course, the more the drugs are pushed, the less will be the amount of chloroform or ether required. In very many of the cases, after the preliminary incision had been made, no further application of the anæsthetic was necessary; in

the remaining cases a whiff of chloroform had to be given from time to time during the continuance of the operation, or small quantities of ether were applied continuously by the open method. We should mention here that in no case where the anæsthetic has been removed at an early stage in the operation have we noticed the patient suffer from shock, even though the operation was a serious one—such as the amputation of an arm or leg. While acknowledging that there are undoubted advantages in the smaller amount of anæsthetic required, we want to urge very strongly that the case for or against the use of this method does not rest only on this question; even in those cases where the patient, at the time of operation, does not apparently react well to the drugs, and where a considerable amount of anæsthetic has to be used, we still can look for the other advantages which we claim.

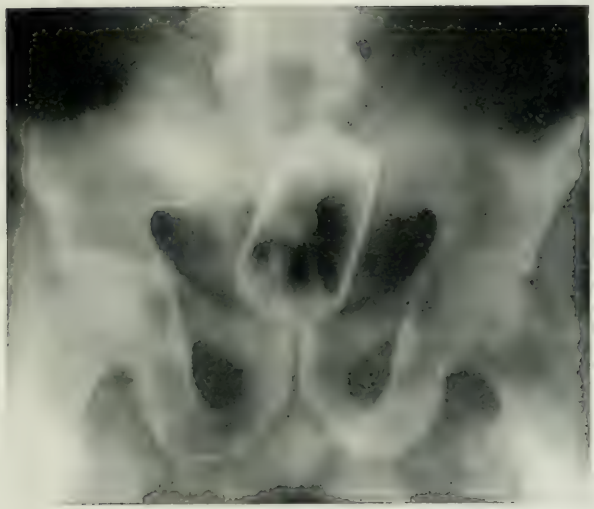
3. That, owing to the fact that the mucous and salivary secretions are to a great extent inhibited by the drug, the trouble caused by the excessive secretion which so frequently accompanies the administration of ether or chloroform is avoided.

4. That as regards sickness, both during and after the operation, the results are particularly good.

5. That the patients sleep on for several hours after the operation, and are thus spared a great deal of pain and discomfort from which they would otherwise suffer, which factors, when present, cannot fail to aggravate any condition of shock from which the patient may be suffering.

Though we have not had an opportunity of testing the combination in this particular way, we would suggest that its use previous to operations conducted under local or spinal anæsthesia would overcome a disadvantage, possibly not sufficiently recognised, namely, the mental effect upon the patient resulting from his being acutely conscious that he is being operated on.

In conclusion, we further suggest that the use of this method, *i.e.* scopolamine and morphine followed by chloroform or ether, reduces very considerably the dangers and difficulties dependent on the administration of a general anæsthetic.



X-Ray photograph of glass tumbler in the rectum.

CLINICAL RECORD.

GLASS TUMBLER IN THE RECTUM. EXTRACTION.

By J. W. DOWDEN, F.R.C.S.,
Assistant-Surgeon, The Royal Infirmary.

One of the late Professor Syme's statements, which he considered an aid to success in practice, was, "Never be surprised at anything you see," and to this might be added, "feel" and "hear." No wonder some incredulity and surprise was evinced when a male patient, aged 30, presented himself at the Surgical Out-Patient Department of the Royal Infirmary in August of this year, with the statement that there was a glass tumbler in his rectum. It was considered more likely that the probable alcoholic contents had affected the brain, but the patient was correct, and examination revealed that a tumbler, some three inches in length, narrow end upwards, was present in the rectum.

An X-ray photograph was taken, and the patient sent to Professor Caird's Wards, of which I happened to be at that time in charge.

The history given—if of any value—is, briefly, that the patient, two days before admission, had been drinking heavily, and that, at 4 in the morning, clothed only in his shirt, he sat down on a bench to fill his pipe. A tumbler, narrow end upwards, happened to be on the bench and, in accordance with fundamental rule, accommodated itself to circumstances. He went to bed unaware of what had happened, but was awakened at 7 A.M. with a desire to defæcate; his efforts were unavailing, and, searching for the cause, he found it in his rectum. His efforts to remove the foreign body proved useless, so he applied the next day to the Infirmary. An anæsthetic was administered, and an endeavour made to extract the tumbler, but this was impossible without further room, which was obtained by splitting the anus backwards and removing the coccyx, when extraction was easy.

The tumbler measured $3\frac{1}{2}$ inches in length, $2\frac{1}{4}$ inches in diameter at its mouth and $1\frac{1}{3}$ inches at the end. On it was engraved the name of a beverage, which—as I have no proprietory interest—need not be mentioned.

The after history was uneventful, except that the patient proved to be a quiet, observant man, with a turn for doggerel verse, emphasising the foibles of other patients.

The X-ray photograph has been reduced by Dr. A. M'Kendrick, to whom I am indebted.

MEETINGS OF SOCIETIES.

Edinburgh Medico-Chirurgical Society.

THE first meeting of the session was held on 3rd November, Dr. James Ritchie, the retiring President, in the chair. Dr. Ritchie gave his valedictory address, which appears in this issue.

Dr. Byrom Bramwell then took the chair.

Dr. A. Bruce and Mr. Wallace, C.M.G., gave a communication on a case of fracture dislocation of the axis vertebra, which was reduced.

The patient was a marine engineer whose previous health had been good. While stooping at his work he turned his head sideways, when he heard a slight click, and immediately found that he was incapable of any lateral movement of the head, and of all but the very slightest anterio-posterior movement. There was pain and swelling at the back of the neck.

This continued for about four months, when the patient was seen by Mr. Wallace. A skiagram revealed a backward dislocation of the bodies of the axis and third and fourth cervical vertebræ, with a fracture of the odontoid process of the axis. There was no lateral displacement. There were practically no pressure effects, and no attempt at reduction was thought advisable.

A few months later patient suddenly turned his head, and immediately felt pain in the back of the head and neck. Next day there was weakness of the fingers, followed by similar weakness of the arms and legs.

On admission to hospital there was practically complete paralysis of the limbs, complete paralysis of the diaphragm, with inability to cough, retention of urine, and anæsthesia. Severe dyspnœa was induced by attempts to speak. The reflexes were exaggerated, and Babinski's sign was present on both sides. The patient's danger and the danger of attempted reduction were explained to him.

He made his will and affixed his mark by holding a pen in his teeth. Reduction was then successfully performed, slight crepitus being heard as it was effected. The patient immediately coughed, and in ten minutes some movement of the diaphragm and legs was seen. Muscular power rapidly returned, and the patient was exhibited at the meeting wearing a poroplastic collar.

Dr. MacGillivray said he had great difficulty in understanding the case. Was the odontoid snapped off by the first injury? Did it become impacted, and, if so, how? The absence of symptoms of pressure on the medulla was very puzzling.

Mr. Cathcart said that fracture of the odontoid process by muscular

action was not unknown, but had been immediately fatal in recorded cases. Dr. Bramwell said that recovery after all four limbs had been suddenly paralysed was unknown. It was different in cases of disease, and he suggested the possibility of previous disease in this case.

Dr. Torrance Thomson and Mr. Denis Cotterill gave a communication on the use of scopolamine and morphine as an anæsthetic adjunct.

Professor Caird said that a means of diminishing the pain and trouble associated with consciousness before and after operation would be desirable. After morphia there was a tendency to trouble with the respiratory centre. The morphia and hyoscine method might be a useful adjunct to spinal anæsthesia.

Mr. Miles had not found scopolamine an entirely safe drug, and thought that the minimum effective dose should be given. After hyoscine and morphine patients breathed more slowly, hence anæsthesia by ether or chloroform took longer to induce.

Mr. J. M. Cotterill said his impression of the method was very favourable. There was absence of alarm before operation, and calm for many hours afterwards. He thought that the method diminished shock.

Edinburgh Obstetrical Society.

THE opening meeting of the session was held on Wednesday, 10th November. Professor Stephenson, the retiring President, occupied the chair, and delivered his valedictory address, which appears in another part of the *Journal*.

Dr. H. M. Church read a paper on "Rheumatoid Arthritis—a Short Report of Two Cases, presumably of Puerperal Causation."

The following were elected office-bearers for the ensuing session :—President—Dr. Haultain ; Vice-Presidents—Dr. Freeland Barbour, Dr. Lamond Lackie ; Treasurer—Dr. Wm. Craig ; Secretaries—Dr. Angus Macdonald, Dr. B. P. Watson ; Librarian—Dr. Lamond Lackie ; Editor of Transactions—Dr. Macrae Taylor ; Members of Council—Dr. J. W. Ballantyne, Dr. W. H. Miller, Dr. A. M. Easterbrook, Dr. W. E. Frost, Professor Stephenson, Dr. Barbour Simpson, Dr. Frederick Porter, Dr. F. D. Simpson.

Forfarshire Medical Association.

AN ordinary meeting of the Society was held on the evening of Thursday, 4th November, in the School of Medicine, Dundee. Professor MacEwan in the chair.

Dr. Don showed the following patients :—(1) A boy, aged 11, with double coxa vara. The left femur showed a fracture through the neck,

an unusual condition, as there was no history of injury. The angle on this side was 40 degrees, and on the right side 90 degrees. The probable cause of the condition was discussed, and the treatment by forcible abduction with reformation of the normal angle, and plaster of Paris bandaging, indicated. A radiogram of the condition was exhibited. (2) A girl, aged 6, with persistent sinus from a left empyema, opened 3 months ago. The lung was quite collapsed. An emulsion of bismuth subnitrate in vaseline, as used by Beck, was injected on four occasions, and the cavity had gradually closed. A radiogram was shown. The treatment, as a rival to pleurectomy in growing children, was discussed. (3) A woman, aged 49, on whom a radical cure for a large post-operative interstitial hernia had been performed. A silver wire filigree was used to close the opening. The result seemed perfect, and a radiogram with the wire *in situ* was shown. The hernia had existed for 12 years, and treatment became necessary owing to rupture of the scar and oozing of large quantities of serous fluid from the peritoneal cavity.

Mr. Price showed a young man from whom he had excised the whole of the right clavicle, owing to it being affected by a mixed celled sarcoma. The tumour occupied the shaft of the bone. He pointed out that in spite of the loss of the clavicle he had still a very useful arm, with good movements.

Specimens of a large calculus removed from the kidney, with radiogram of the calculus *in situ*, and a carcinoma of the ascending colon were exhibited by Professor MacEwan.

Dr. Kerr read notes on a "Fatal Case of Industrial Anthrax in a Brushmaker," and Dr. Mackie Whyte a paper on "The Study of Psychiatry in Munich," both of which will appear in the *Journal.*

DEATH UNDER CHLOROFORM ANÆSTHESIA.

An inquest was held by Dr. F. J. Waldo in the City Coroner's Court on Monday the 25th of October upon the body of Herbert George Turnidge, aged 50, a wood machinist, of 11 Fortescue Avenue, Hackney. The deceased was reported to the Coroner as having died in St. Bartholomew's Hospital on the 22nd of October whilst under the influence of chloroform given for an operation for the treatment of a gastric ulcer.

Dr. Sturdy, House Surgeon to St. Bartholomew's Hospital, said the deceased first came under his care in February last with a septic hand, for which he was placed on three separate occasions under the influence of gas and ether, and three fingers removed. The deceased was again admitted to hospital on the 8th of September suffering from symptoms of gastric ulcer and bronchitis. His heart was apparently healthy. After six weeks' treatment, Mr. Bowlby, Honorary Surgeon to the Hospital, decided on the 22nd of October to perform laparotomy, but before the operation was commenced the patient suddenly collapsed, and died whilst under the influence of chloroform.

Mr. W. Foster Cross said he was the second chief of the visiting anæsthetists at St. Bartholomew's Hospital, where he had successfully given anæsthetics in over 26,000 cases. There were four visiting and two special expert resident anæsthetists on the staff of St. Bartholomew's Hospital. In answer to the Coroner he agreed that one of the chief duties of the anæsthetist was the careful selection of the most suitable drug, or combination of drugs, for the individual case. He also agreed that, according to the opinions of eminent authorities, fatalities were about six times more frequent with chloroform than with ether—more especially in the hands of comparatively inexperienced men. In the case of the deceased, he had given chloroform in preference to ether, owing to the condition of the lungs of the patient, who at the time was suffering from bronchitis and emphysema. He thought it a matter of grave importance that a clinical examination of the patient should be made before choosing the anæsthetic. In the present case such examination disclosed the fact that, in addition to the lung trouble, there was no sign of any organic disease of the heart beyond a somewhat slow pulse beat. The chloroform used was that prepared from dutiable ethylic alcohol. That made from the cheaper methylated alcohol, or from acetone—one of the products of the distillation of wood—was never used at St. Bartholomew's Hospital. The Coroner remarked that anæsthetists and surgeons from hospitals, other than St. Bartholomew's, had repeatedly told the Court that the chloroform used by them, made from acetone, was chemically the same and quite

as safe as any other kind, and much cheaper. What was the witness's experience in this matter? Mr. Cross said he did not agree with this dictum, and did not believe that the effects and risks were the same from the three kinds of chloroform. He thought the very purest chloroform —or, in other words, that made from ethylic alcohol—should be used in all operations. Such was the invariable custom at St. Bartholomew's Hospital, since he and his colleagues were agreed that this was the safest preparation for the patient. The deceased had been properly prepared for the anæsthesia, and was given the chloroform whilst in the dorsal posture. No excitement or struggling was displayed, or vomiting, or stertor during the administration. After the chloroform had been given for a few minutes, at the end of the induction period, the face changed colour. This was followed by a stopping of the pulse. The respiration continued for some seconds after the failure of the circulation before the breathing finally ceased. Efforts to restore animation by means of artificial respiration were kept up for half an hour. Injections of strychnine and ether were also tried, but without avail. The immediate cause of death was heart failure.

Dr. Spilsbury, the independent expert pathologist to whom the Coroner had given the order for a post-mortem examination, said he was pathologist to St. Mary's Hospital. The results of his examination, with his conclusions as to the cause of death, were contained in the written report which he handed to the Coroner. He had, by means of microscopical examination, found the heart to be slightly degenerated. There were signs, also, of chronic bronchitis and emphysema, as well as of a large, deep ulcer in the wall of the stomach. He had heard all the evidence given in Court, and was of opinion that death was caused by syncope in a patient suffering from degeneration of the heart muscle, and from an ulcer of the stomach, and accelerated by the chloroform given as a general anæsthetic for an operation.

Dr. Spilsbury agreed with the evidence of Mr. Cross, the anæsthetist, to the effect that the purest chloroform—that made from dutiable spirit —was physiologically the safest form in which to administer this powerful and poisonous drug. Mr. Cross and Dr. Sturdy, recalled, said they had been present at the post-mortem examination, and after having heard Dr. Spilsbury's evidence they agreed with him as to the cause of death.

The Coroner, in summing up, said he thought too little attention so far had been given by those responsible for the administration of anæsthetics, such as chloroform and ether, which the jury had been told were powerful poisons, as to the actual relative safety or otherwise of the drug employed, and made either from ethylic alcohol, or from methylated alcohol, or from acetone. Observers of the greatest eminence, and connected with some of the principal hospitals in London, differed materially in their opinion and practice on this important

subject. The steward of St. Bartholomew's Hospital had told the Court that the Budget now before Parliament would be the means of adding to the expenditure of the hospital from £400 or £500 per annum in increased taxation alone on such necessary drugs as chloroform made from dutiable spirit.

He (the Coroner) had, some months ago, written to the Chancellor of the Exchequer pointing out the penalising effect on the poor of this new taxation, and at the same time suggesting a rebate, but apparently without any practical effect.

He (the Coroner), with the object of lessening the number of unnecessary and unnatural deaths, had already made, amongst other specific recommendations (see article "Deaths and Anæsthetics," *Lancet*, 21st March 1908), the following three, namely :—

1. That no general or local anæsthetic shall be administered by any but a duly qualified medical man, except under most exceptional circumstances, which shall be duly reported to some recognised official authority.

2. That, so far as possible, special skilled anæsthetists be appointed to all hospitals and infirmaries, and that resident anæsthetists be provided in the largest institutions.

3. That a Royal Commission with advisory powers might with advantage be appointed to inquire into the present facts of deaths under anæsthesia, together with the official machinery available for registration. A departmental Committee of the Home Office had since been appointed to inquire into the law relating to coroners and coroners' inquests, and into the practice in Coroners' Courts, and subsequently had been requested by Mr. Gladstone to inquire, also, into the big subject of "Deaths under Anæsthetics." He (the Coroner) would suggest that such Committee, if they had not already done so, might, with advantage to the public, take evidence on the question of the relative safety or otherwise of anæsthetics such as chloroform and ether as made from such varying chemical compounds as ethylic alcohol, from methylated spirit, or from acetone.

The verdict of the jury was to the effect that death was caused by heart failure in a patient suffering from a degenerated heart, and from ulcer of the stomach, accelerated by chloroform administered as an anæsthetic with skill and due care for a necessary operation, and from *misadventure*.

RECENT LITERATURE.

CRITICAL SUMMARIES AND ABSTRACTS.

MEDICINE.

By J. S. FOWLER, M.D., F.R.C.P.

Tuberose Sclerosis.

Tuberose sclerosis was described for the first time by Bourneville in 1880, in a paper on the "Pathological Changes in the Brains of Idiots." During the following twenty-five years some twenty or thirty further cases were recorded, but the condition was regarded merely as a rather rare pathological curiosity, and only during the past year or two has any real light been thrown on the nature of the disease. Thanks, in particular, to Vogt's work, tuberose sclerosis must now be regarded as a definite developmental disease of the brain, producing mental defect, and associated in many cases with peculiar and characteristic lesions of other organs. It has been possible in several cases to arrive at a correct diagnosis during life, and there is reason to hope that as our knowledge of the clinical features of the condition increases we shall become more and more able to distinguish this from other forms of imbecility.

The leading features of tuberose sclerosis are :—(1) An absolutely characteristic lesion of the cerebral cortex, and in nearly all cases small tumours of the lateral ventricles. (2) Imbecility, in most cases associated with epileptic fits. (3) The occurrence of curious visceral tumours—of the kidney and heart, in particular. (4) The peculiar tumour growth in the skin known as adenoma sebaceum. Not all of these, of course, are necessarily present in every case : the brain lesion and mental defect are invariable ; the other somatic changes are less constant, but are probably more common than would appear from the records of cases, because in many of the older papers the kidneys and heart were not reported on. It is also noteworthy that, in several cases reported as congenital tumour of the heart, a sclerotic condition of the brain has been described, though the connection between the lesions was not appreciated.

Appearance of the Brain in Tuberose Sclerosis.—The appearance of the brain is extremely well described by the adjective "tuberose," or perhaps even better by Sailer's term "nodular" sclerosis. On looking at the cortex, single convolutions, or adjacent parts of convolutions, are seen to project in a tumour-like fashion slightly above the adjacent surface ; they are pale, and when touched are felt to be unduly firm, giving the impression that the affected area has grown abnormally. These

sclerosed patches are fairly numerous—perhaps ten or twenty, scattered over the brain. The pia over them is normal, and strips readily, and otherwise the configuration of the brain is normal. On cutting into one of these sclerosed convolutions the cortex is found to be broadened, and the edges of the patch are ill defined, merging insensibly with the normal brain tissue. In the white substance grey strips and foci are sometimes seen. A further characteristic feature is the occurrence of tumour-like projections from the walls of the lateral ventricles, usually in the thalamic region; these vary in size from that of a small pea up to that of a cherry. Similar tumours of the fourth ventricle are rare, and sclerosis of the cerebellum is equally uncommon.

The histological changes are as follows:—(1) The nerve cells in the sclerosed areas show signs of mal-development; they are badly differentiated from each other, the distinction between the different layers is lost, and the cells as a whole are diminished in number. (2) Atypical cells, so-called "large cells," which are probably derived from nerve cells, are present. (3) There is an enormous glial proliferation. (4) Some of the nerve cells show signs of degeneration. (5) There is no evidence of any inflammatory change. In all the cases examined the changes have been the same, the only differences being that in early cases the mal-development of the nerve cells, in late cases the degenerative changes, are more pronounced. The developmental change is primary, the degeneration and overgrowth of glia being secondary. The ventricular tumours are gliomatous, containing the "large cells" referred to above.

2. *Clinical Features.*—There is always mental defect. The more severe the lesion of the brain the earlier does this show itself. Some of the patients are said to have developed normally for a year or two, and then to have shown signs of imbecility; but probably this is largely to be explained by the fact that parents are unwilling at first to believe that a child is deficient. An infant, aged thirteen months, suffering from this disease, who was recently under the writer's care, was distinctly mentally deficient. It is, however, somewhat characteristic of the mental defect associated with tuberose sclerosis that it tends to progress, and a child who at two or three years old could articulate a word or two may sink into the lowest grade of idiocy. Epileptic fits are very common, occurring probably in at least nine-tenths of all cases. They are often the first sign that anything is wrong. The epilepsy, however, is not specially characteristic; minor and Jacksonian seizures may predominate, but major attacks are always present at some period, and may constitute the sole manifestation of epilepsy. As a rule, the fits recur at moderate intervals of time—say of three or four weeks—and they generally occur in a small series—one or two—at a time. Finally, the occurrence of status epilepticus is often the immediate cause of death. In some cases paralysis and contractures

ultimately develop and render the patient bedridden. The degree of mental defect varies a good deal. The worst cases are vegetative idiots; one of the mildest recorded is that of a girl who was able to attend the lower classes of a secondary school, and, later, could work under supervision. The majority of the patients are markedly imbecile. On the whole, then, the main features of tuberose sclerosis are epilepsy with progressive dementia, the advance of the dementia being to a considerable extent dependent on the frequency and severity of the convulsions. In the majority of cases there is a very definite neuropathic heredity.

3. *Visceral Lesions.*—Of these the tumours of the kidneys are much the most important. These have been found in about 50 per cent. of all cases, in spite of the fact that from many of the records it is apparent that the kidneys were not examined. The lesion is always bilateral, the kidneys showing on section numerous tumours. In advanced cases the whole kidney may be replaced by a tumour-mass. The new growth belongs to the group of hypernephromata. In not a few cases the tumour of the kidney has proved the immediate cause of death.

Tumours of the heart are less common than those of the kidney, and when they are present the patient rarely survives infancy. The case under my own care died at the age of thirteen months, and in it there was a tumour of the heart. The cardiac tumours consist of embryonic muscle cells, and are probably congenital. Tumours of the thyroid and thymus have also been met with in one or two instances.

4. *Adenoma Sebaceum.*—From a diagnostic point of view this is the most important distinctive feature of tuberose sclerosis. Although it may occur in otherwise normal children, the majority of those who suffer from it are mentally defective, and it is relatively common in institutions for imbeciles. Two types are described—(1) A form chiefly affecting the face, consisting of small, closely set, sometimes confluent, nodules, more or less symmetrically disposed on the cheeks, brow, and along the naso-labial folds; (2) a type described by Barlow, in which the nodules are larger, non-symmetrical, and are situated on the scalp and general surface of the body as well as on the face. Adenoma sebaceum is regarded by dermatologists as mal-development of, and tumour growth in connection with, the glands of the skin. It does not seem to develop in infancy, but may appear as early as the fifth year.

Duration of Life.—Most cases of tuberose sclerosis die young, often about the age of puberty. One case at least reached thirty-five, and several have attained the third decade. Congenital tumour of the heart appears to be incompatible with more than a year or two of life.

Diagnosis.—All cases of epileptic imbecility should be carefully examined for evidences of tumour of the kidney, the presence of which would be strongly in favour of tuberose sclerosis. The only evidence

of tumour of the heart, so far as is known, is cardiac failure. Adenoma sebaceum in an epileptic imbecile is also very suggestive, but whether the association of the two conditions is invariably due to tuberose sclerosis it is at present impossible to say.

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SURGERY.

By ALEXANDER MILES, F.R.C.S.,
Surgeon, Royal Infirmary, Edinburgh.

ULCER OF THE DUODENUM.

IT is only within recent years that the clinical significance of ulcers of the duodenum has been fully recognised, and it is to surgeons largely that we owe our present knowledge of their rôle in the production of symptoms. In a recent paper E. A. Codman (*Boston Med. and Surg. Journ.*, 2nd, 9th, and 16th September 1909) emphasises "the importance of distinguishing simple round ulcers of the duodenum from those ulcers which involve the pylorus or are above it." Ulcer of the duodenum he believes to be a very common disease—as common, indeed, as acute appendicitis.

By the simple round ulcer, he means those deep ulcers which involve the muscular coat. They are usually so small and insignificant that they may readily be overlooked in the folds of the mucosa. As a rule, they are from 1 to 2 cm. in width, and look like a bullet hole; they lie just outside the pyloric ring, and are surrounded by a varying degree of inflammatory induration. The author makes a suggestive comparison between this type of ulcer and fissure of the anus. The contracted pylorus, as seen from the duodenal side, is not unlike the anus, and the ulcer lies so near the orifice that when the sphincter is contracted it may be buried in the folds of the mucosa. This may help to explain the freedom from pain when the stomach is full and the pylorus closed; and it may throw light on the causation of pylorospasm, and on the exacerbations to which these patients are subject

from time to time, just as the soreness of a fissure varies with occasional attacks of local irritation. The chronicity of these ulcers may also be due to their proximity to the sphincter, which prevents them healing, because they are constantly being opened and folded in again by the action of the pylorus. When folded in, neither gastric juice nor bile can irritate them, but during acute exacerbations the very presence of induration about them may keep the raw surface from infolding. The beneficial effects of gastro-enterostomy in some cases may be due to the rest afforded to the ulcer, very much as an artificial anus in the iliac region favours the healing of a fissure.

As the ulcer increases in size it encircles the gut, and later spreads stomach-ward.

For convenience he divides cases of duodenal ulcer into eight clinical groups. 1. *Those that are recognised because of perforation into the general peritoneal cavity.* The clinical features of this group so closely resemble those of acute appendicitis, that the author believes that many cases are wrongly diagnosed; the abdomen is opened and drained, and, whether the patient lives or dies, the condition is supposed to have been appendicitis. In illustration he cites his own experience. In the first 100 cases of "appendicitis" he operated upon there was no case which was recognised as a perforated duodenal ulcer, while in the last 100 every sixteenth case proved to be a perforated duodenum. This difference he can only explain on the supposition that the appendix was believed to be at fault because it was found to be inflamed and covered with fibrin *externally*, the absence of ulceration or gangrene of the mucosa having been overlooked. "It does not follow from the fact that a case recovered after removal of the appendix and drainage of the peritoneum that the case was not one of perforated ulcer, for drainage alone may be sufficient to let the ulcer close and seal with fibrin." To avoid this error the appendix should be opened and examined after removal, and if no gross lesion is found to account for the peritonitis, the duodenal region should be explored.

2. *Those that perforate and cause localised abscess.* The limitation of the abscess may be due either to pre-existing adhesions or to the protective influence of the peritonitis set up by the perforation. The aperture in the duodenum may become closed by fibrin or by omentum becoming adherent over it. The frequency with which a subphrenic abscess develops in these cases may be due to the gas that escapes holding open a space, in which the pus becomes localised.

3. The cases *that are recognised by hæmorrhage* are usually diagnosed with ease, as the bleeding is nearly always sufficiently copious to cause hæmatemesis or melæna.

4. The fourth group includes those cases in which the *characteristic symptoms, without hæmorrhage,* are present.

5. The fifth group includes those cases which are *confused with gastric*

ulcer. The cause of the confusion probably lies in the fact that the ulcer has spread to the pylorus and has invaded the stomach. The recognition of the primary seat of the ulceration in these cases has affected the statistics, so that many cases which previously were included as gastric ulcers are now classed with duodenal. The more recent experience of Mayo, Moynihan, and others shows that duodenal ulcers outnumber gastric ones.

6. In a considerable number of cases when the abdomen is opened the only lesion found to account for the symptoms is *periduodenal adhesions*.

7. A very large group is that which includes the cases previously looked upon as "gastric neurosis," "nervous dyspepsia," or "hyperacidity." Moynihan's observations have proved conclusively that a large proportion of these cases are really examples of duodenal ulcer.

8. In a considerable number of cases there are no symptoms, and it is a common experience that patients in whom perforation occurs, or who suffer from a serious hæmorrhage, have never made any previous complaint of stomach trouble.

The author gives in tabular form the features which characterise respectively the ulcer below the pylorus, that on the pylorus, and that above the pylorus (gastric ulcer), and argues at some length that for the ulcer of the duodenum, gastro-enterostomy is irrational. The only reason he accepts in favour of the operation in these cases is "that the Mayos, Moynihan, and others say that it gives good results in very bad cases."

In an interesting paper on "Gastric Surgery" (*Proceedings of the Royal Society of Medicine*, 8th June 1909), Stanmore Bishop reports a case of perforated duodenal ulcer in a girl of 19, operated upon 4 hours after perforation occurred. The perforation was a minute one, situated on the antero-superior wall of the duodenum, about half an inch distal to the pylorus, and was closed by two superimposed purse-string sutures. A fortnight later the abdomen was reopened and a posterior gastro-enterostomy performed. The site of the perforation was adherent to the fundus of the gall-bladder, but the adhesions were easily separated. There was very slight puckering of the invaginated area, and the purse-string sutures had disappeared.

In another case, that of a man, æt. 59, there was a clear history of perforation of a duodenal ulcer having occurred a year before, with recovery without operation. As the symptoms of ulcer persisted, gastro-enterostomy was decided upon, and on opening the abdomen the indurated area of stomach-wall, about two inches in diameter, was covered by adherent omentum. The symptoms disappeared after the operation.

Jejunal Ulcer following Gastro-Jejunostomy.

An exhaustive paper on this subject is contributed by Herbert J. Paterson (*Proceedings of the Royal Society of Medicine*, 1909, vol. ii.). The following are the main conclusions he draws from a study of his own and of the recorded cases:—(1) The risk of jejunal ulcer following gastro-jejunostomy is probably under 2 per cent., and the complication appears to be less frequent now than previously; (2) the ulcer may perforate into the general peritoneal cavity, or into a space limited by adhesions; (3) the ulcer may be jejunal, gastro-jejunal, or at the site of the anastomosis; (4) jejunal ulcers are sometimes of infective origin, appear soon after the operation, and are usually multiple; (5) the majority are probably the result of the toxic action of hydrochloric acid and other substances, and are single; (6) gastro-jejunal ulcers are a direct consequence of the wound made in effecting the anastomosis, and their persistence is probably the result of hyper-acidity of the gastric juice; they are liable to be followed by cicatricial stenosis of the new opening; (7) diminution of bile and pancreatic juice in the jejunum favours the occurrence of ulcers as the free hydrochloric acid is not neutralised; operations of the Y-type or entero-anastomosis are therefore inadvisable; (8) no case of ulcer following the no-loop posterior operation has yet been recorded; (9) in chronic cases, medical treatment directed to correcting hyper-acidity should be tried before having recourse of a further operation.

OBSTETRICS AND GYNECOLOGY.

By J. W. BALLANTYNE, M.D., F.R.C.P.,
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Ovarian Teratoma.

Antonio Duse (*Ann. di ostet. e ginec.*, ii. for 1909, pp. 297-312), working in Professor Foà's Pathological Institute at Turin, has put on record a striking instance of ovarian teratoma with peritoneal pseudo-metastases. The patient was a girl of 14, who had menstruated for the first time 6 months before entering the Turin Hospital; for 4 months menstruation occurred regularly and then it was suspended; during a period of 20 days the abdomen increased markedly in size, and there was a painful sensation of weight at the hypogastrium, along with oliguria, cough, dyspnœa, and anorexia; the general strength and health rapidly depreciated. The physical signs indicated the presence of two irregular hard growths in the lower part of the abdomen, giving a dull note on percussion, and the sense of fluctuation extending up to the costal margin on each side, and reaching in the middle line to four finger-breadths above

the umbilicus. The umbilicus itself was projecting, and the cutaneous veins of the abdominal wall were prominent. There were also the signs of pleurisy with effusion on the left side. There was some fever in the evenings, the pulse varied from 120 to 135, and the respirations from 30 to 40; the urine was scanty, and only once showed a trace of albumen. The examination of the blood showed 4,500,000 red cells and 6200 white. Thoracentesis was performed, and the fluid showed no tubercle bacilli. The patient was transferred to the surgical side of the hospital, and Professor Bobbio performed an exploratory laparotomy, during which he found two large tumours, which could not be removed, springing from the true pelvis, numerous nodules on the visceral and parietal peritoneum, and clear serous fluid. The patient died in a state of profound cachexia some 3 months later, or 6 months after the first appearance of symptoms. At the autopsy two tumours were found, one in the pouch of Douglas, the other in the position of the right ovary (which had entirely disappeared); numerous miliary nodules studded the peritoneum, and some larger ones were found in the prevesical pouch. The two large tumours were solid teratomata, the miliary nodules were nothing more than neoplasms made up of young fibrous connective tissue, and the larger vegetations were due to the presence of foreign bodies (hairs, scales of epidermis, &c.) which had escaped from the endoperitoneal bursting of a small cyst. The aortic, hypogastric, pelvic, and parauterine glands were not enlarged. The infantile uterus with the tube and ovary of the left side was pushed upwards and forwards. Derivatives of the three embryonic layers were present in the large tumours, and these are described in detail by the writer. The conclusions drawn from the study of the case are—(1) that if we find a rapidly growing tumour in the ovarian region of a girl at the period of sexual development, we should think of ovarian teratoma, especially if there exist also the clinical signs of malignancy; (2) that a teratoma is clinically and anatomically a malignant tumour without the intervention of either sarcomatous or carcinomatous degeneration; and (3) that the presence of peritoneal granulations ought not to arrest the hand of the surgeon preparing to operate, for these growths, especially if small in size, may be pseudo metastases of an inflammatory nature, which will diminish or disappear after the operation.

Hyperemesis Gravidarum.

L. Devraigne (*L'Obstétrique*, N. S., vol. ii. pp. 313-323, 1909) has studied the blood in cases of uncontrollable vomiting of pregnancy. He points out that Tuschkai in 1903 regarded the appearance in the blood of megaloblasts and the diminution in the red cells (*i.e.* globular anæmia) as an indication for the induction of abortion. Bonnaire's observation made in 1908 appeared to support Tuschkai's conclusion.

Devraigne, however, had thrown doubt upon this view in 1906, and was of opinion that a high percentage of hæmoglobin with hyperglobulia (polycythæmia) was of evil omen in cases of hyperemesis, and further observations had confirmed him in this conclusion. The polycythæmia was due to relative concentration of the blood. Pinard's article (*Ann. de gynéc. et d'obst.*, 2 S., vi. p. 396, 1909) brings out the frequency (15 per cent.) of hyperemesis in cases of molar pregnancy.

Duration of Pregnancy.

G. Horne (*Trans. Austral. Med. Congress*, Session viii., vol. ii. p. 68, 1909) discusses anew the old problem of the calculation of the duration of pregnancy. He is of opinion that the duration may be expressed by an equation $D = 10M$, where D is the duration and M a variable depending, *inter alia*, on the maternal menstrual cycle, and he supports his conclusion with observations on 150 labour cases. Horne is further of opinion that labour comes on because the uterine contents are mature, and he thinks, therefore, that if it takes 28 days for the ovum to mature in the ovary, it will take ten times as long for the ovum to mature in the uterus. But there are causes of variation depending upon the length of the menstrual cycle in the mother, in the father's mother ("potential paternal cycle"), and upon the law of reversion to type. From these considerations the writer evolves the following curious equation:—

$$D = 10\left\{\frac{\frac{y}{x}m + \frac{x-y}{x}n}{2} \pm R\right\}$$

where m and n are respectively the maternal and paternal potential cycles, and R is the reversion to type. In illustration, he gives the following example:—A family consisted of three brothers, A., B., and C., and two sisters, X., Y. They are all married. X. and Y. each had a menstrual cycle of 30 to 31 days, and have each had two children. These four confinements have been 15, 12, 14, and 16 days beyond the estimated time. A. and C. married wives whose cycle was 28 days, and the three children born were 14, 13, and 14 days after expected. The wife of B. had a period of 23 to 25 days, and her child was born 259 days after last menstruation. In the 150 cases collected by Horne there were 104 with normal cycles, and, allowing for errors, they all had pregnancies of about 280 days, counting from the last menstrual period. There were 20 with short cycles, and of these one who menstruated every 21 days had a boy after 210 days, and seven other children all before the 280th day, the boys being further from the normal than the girls. There were 17 with long cycles of 30 to 33 days, and lengthening of the pregnancy was noticed in some of these patients of whom the facts could be obtained. In conclusion, Dr.

Horne is sure that "we are justified in stating an equation for the duration of pregnancy, but the difficulty of determining its variables renders it more interesting than practicable."

Cæsarean Section in Placenta Prævia.

Victor E. Marshall (*Med. Rec.*, vol. lxxvi. p. 601, 1906) pleads for the occasional employment of Cæsarean section in selected cases of placenta prævia. He records the case of a patient with spinal kyphosis who had had two previous labours both terminated by the high forceps operation; on the first occasion the child was dead, and on the second it died in 18 hours from congenital hypertrophy of the thyroid gland. In the ninth month of her third pregnancy she was suddenly attacked with hæmorrhage, unaccompanied by pain. Placenta prævia was diagnosed with a narrow pelvis and the os uteri admitting only one finger. The vagina was plugged, and the patient removed to hospital, where Cæsarean section was performed and a living child brought into the world; both mother and baby did well. Marshall admits that obstetric opinion on this subject is divided, but he thinks that "if Cæsarean section can be used to extricate us from an occasional heroic situation, practitioners should certainly avail themselves of it." He suggests the following indications:—(1) Central or lateral prævia (when these can be diagnosed), with or without profuse hæmorrhage; (2) child at term, and living; (3) sterile birth canal, *i.e.* normal temperature of mother and favourable surroundings; (4) justo-minor pelves, with a conjugata vera of 3½ inches or less; (5) deformed pelves; and (6) a history of difficulty and fœtal death in previous operative deliveries. Individual judgment is required in any particular case, and no set of rules can be formulated; the operator must have a belief in his own aseptic technic, and, in private practice, he must have the unqualified confidence of his patient.

Appendicitis in Pregnancy.

Edmund A. Babler (*Interstate Med. Journ.*, vol. xvi. p. 680, 1909) has met with two cases of perforative appendicitis in pregnancy. In the first of these a large appendiceal abscess formed at the sixth month of pregnancy; it was incised and drained, and 48 hours later abortion occurred; the mother recovered. The second case was a puerperal one: she had pain in the right side of the lower part of the abdomen during the eighth and ninth months of pregnancy and at the confinement; she had a rigor after delivery, and again on the day following; when Babler saw her 3 weeks later she was septic; she had a semi-solid painful mass about the size of a cocoanut in the right inguinal region, and there was an abscess over the left half of the sacrum. The sacral abscess was opened, and about a pint of slightly offensive pus was evacuated. Two days later the

abdomen was opened, and it was found that the mass in the right inguinal region consisted of the uterus, the right tube and ovary, and the caput cæcum ; the median abdominal incision was at once closed in layers, and an incision was made just above and an inch internal to the right anterior superior iliac spine. The pus sac was incised, the contents evacuated, and the cavity drained ; both cavities (sacral and inguinal) were irrigated daily for some weeks. The patient made a complete recovery, and left the hospital in 3 months. The writer draws certain conclusions. He believes that perforative appendicitis is one of the gravest complications of pregnancy, and that it occurs more frequently than the tabulated cases would indicate ; pregnancy does not apparently predispose to a primary attack of appendicitis, but may precipitate an attack in chronic cases ; the diagnosis is not, as a rule, difficult, but the possibility of ureteritis and pyelitis must be borne in mind ; early efficient surgical intervention is the secret of success in the treatment of appendicitis in pregnancy ; and it is far better to evacuate an appendiceal abscess before emptying the uterus. Babler has collected 235 cases of appendicitis complicating labour and the puerperium. Of the pregnancy cases (207) there were 103 of the perforative variety, and of these 89 were operated on ; 36 mothers died, and 33 aborted before and 37 after the operation ; all the 14 patients not operated on died, and 9 of their infants. Of the 104 non-perforative cases, 50 patients were operated upon ; 7 aborted, and 1 mother died ; while of the cases not operated on, 6 patients aborted, and 4 died. There were 28 puerperal cases, of which 18 were perforative ; 12 of the latter were operated on, and 4 died ; 2 of the 5 not operated on accidentally recovered, the abscess bursting into the rectum ; all the non-perforative cases recovered. The lesson to be learnt is that delay is the cause of the mortality.

Treatment of Moderate Degrees of Pelvic Contraction.

Dr. Heinz Kupferberg of Mainz (*Zentralb. f. Gynäk.*, vol. xxxiii. p. 1553, 1909) lays down certain rules regarding the management of labour in moderate degrees of pelvic contraction. When possible, premature labour is artificially induced between the thirty-second and thirty-fourth weeks of gestation ; previously the maternal pelvis and the fœtal head have been investigated under an anæsthetic to determine their relative size. If the patient be in labour at the full term and the infant be dead, the fœtal head is perforated and the child removed by the cranioclast. If, however, the child be alive, and the examination under anæsthesia show disproportion between the head and the pelvic brim, then in a primipara suprasymphysary Cæsarean section should be performed, the bladder being distended beforehand, and in a multipara hebosteotomy (Bumm's or Döderlein's method) should be preferred, and a spontaneous delivery waited for.

PHYSIOLOGY.

By T. H. MILROY, M.D.,
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Adrenalin Diabetes.

Recently the opinion has been widely expressed that the glycosuria which sets in after pancreas extirpation is due to the removal of an organ which exercises an antagonistic influence on the glycosuric action of adrenalin.

The grounds for this hypothesis are the following:—If pancreas extract be injected prior to, or during the period of, adrenalin injection, the glycosuric effect of the latter is neutralised. And again, if suprarenals and pancreas be removed at the same time, the dog does not become diabetic.

The *modus operandi* of adrenalin is, however, still a subject for discussion.

Pollak, in his experimental studies of adrenalin diabetes (*Arch. f. Exp. Path. u. Pharmakol.*, Bd. lxi. S. 149), has tried to clear up a number of obscure points relating to this subject. In the first place, he investigated the action of adrenalin on the storage of glycogen in the liver. It is well known that in pancreatic diabetes the glycogen formed from levulose may be stored in the liver, while that from glucose cannot be so retained. Pollak therefore studied the action of adrenalin on the hepatic glycogen stored after glucose and levulose respectively had been given. The experiments of earlier investigators have gone to show that glycogen is easily removed from the liver by large doses of adrenalin, but if the adrenalin be given in very small but gradually increasing doses, the effect upon the hepatic glycogen is very slightly marked. The action of adrenalin upon glycogen formed from levulose had not been investigated until Pollak took the subject up. The results of his experiments dealing with the subject may be briefly summarised as follows:—When large doses of adrenalin are given, glycogen, whether formed from glucose or levulose, is easily removed. If small doses, however, are given, the glycogen formed from levulose is found to be much more resistant than that obtained from glucose.

The author has brought forward a number of extremely interesting facts concerning the relationship of hyperglycæmia to glycosuria. These may be briefly summarised as follows:—

1. When one small subcutaneous injection of adrenalin is given to an animal which possesses an abundant store of glycogen, glycosuria is readily set up. If, on the other hand, a single dose of adrenalin, however large (say 0·01 to 1 mgm.), dissolved in a small amount of fluid be injected intravenously into a rabbit, glycosuria is never produced.

The intravenous injection leads to a hyperglycæmia, but this is not

sufficiently marked to produce a glycosuria, owing to the small quantity of urine which is passed. If diuresis be produced at the same time, glycosuria always puts in an appearance. The single subcutaneous injection produces a hyperglycæmia sufficiently marked to result in glycosuria without any increase in diuresis. In rabbits, more than 0·15 per cent. and less than 0·25 per cent. glucose in the blood, if there be at the same time marked diuresis, leads to glycosuria. Examples of this condition are caffeine glycosuria, and the glycosuria *with diuresis* produced by an intravenous injection of adrenalin. Without diuresis this percentage of sugar in the blood will not, as a rule, produce glycosuria. Examples: hyperglycæmia after laparotomy, and hyperglycæmia after intravenous injection of adrenalin when no diuresis has been produced.

A percentage of sugar in the blood higher than 0·25 per cent. leads to glycosuria, even when no diuresis has been produced. Example: subcutaneous adrenalin injection.

2. If a high percentage of glucose in the blood be kept up for some time, the kidneys will finally no longer excrete glucose. This is regularly to be observed after frequent subcutaneous adrenalin injections.

3. Conversely in certain cases glycosuria may occur with the sugar percentage of the blood scarcely, if at all, above normal. Cases of this kind are noticed after certain renal poisons have been given, *e.g.* cantharidin, mercuric chloride, uranium salts, &c.

In his latest studies concerning adrenalin diabetes, Pollak draws attention to a most interesting fact. In rabbits, which have been rendered glycogen-free by starvation or by the action of strychnine, adrenalin, when given in increasing doses, produces such a storage of glycogen in the liver as is usually only to be observed after prolonged carbohydrate feeding, although the muscles remain practically free from glycogen. Nishi, working in the same laboratory as Pollak, investigated the nature of the hyperglycæmia produced by withdrawal of blood. He found that the hyperglycæmia so produced was not affected either by section of the splanchnic nerves on both sides or by removal of the suprarenals. He therefore concludes that it is due to a direct action on the liver.

The Nitrogen Excretion under Different Diets.

Karl Thomas (*Arch. f. Anat. u. Physiol.*, S. 219, 1909) gives a number of most interesting results obtained in an investigation dealing with the value of different diets in maintaining nitrogenous equilibrium. When a diet was taken consisting almost entirely of potatoes, with the addition of fat in the form of butter or salad oil, the nitrogen excretion in the urine amounted only to 5·525 grms. During this time the person remained in nitrogenous equilibrium. It is interesting to notice that Richter (*Deutsche med. Wochenschr.*, No. 49, 1908) and

Hedinger (*Deutsche Arch. f. klin. Med.*, Bd. xcvi., S. 339, 1909) have strongly recommended a potato dietary as leading to a loss of fat and water, while maintaining the nitrogen content of the body constant. When cow's milk was taken the results were of quite a different nature, the proteins of the milk being used evidently largely for dynamogenic purposes. Thus, for example, on such a diet the nitrogen metabolism amounted approximately to 18 grms. This may be markedly lowered by adding to the diet a sufficient amount of carbohydrates and fats to cover the energy requirements of the individual. But even if the nitrogenous constituents are protected from being used as sources of energy, the nitrogen minimum excretion remains higher than on the potato diet. The author courageously investigated the action of a pure carbohydrate diet upon the excretion of nitrogen. He then carefully studied the effects produced by the addition of various nitrogenous food-stuffs to this diet. He stated his results in terms of the biological value of each of these nitrogenous food-stuffs. The "biological value" was arrived at by the following calculation :—

Urinary Nitrogen on a N-free diet + Balance on addition of a nitrogenous food-stuff.

Nitrogen absorbed.

The biological values (approximate) so attained for various food-stuffs may be quoted here :—

Beef	105
Milk	99
Rice	85
Crabs	73
Casein	66
Nutrose	63
Spinach	64
Peas	50
Maize	12-24

PATHOLOGY.

By JAMES RITCHIE, M.A., M.D., M.R.C.P.,
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The Wassermann Reaction in Syphilis.

During the past two years the results of several researches have been published, the object of which has been to show that the serum of syphilitic patients possesses special and specific properties. The importance of such investigations, especially from the standpoint of the diagnosis of this protean disease in its obscurer manifestations, is at once apparent, and it is not surprising that widespread interest has

been aroused in the problems opened up; it is still too early to say whether the different tests applied for the recognition of the specific qualities of the body fluids of the syphilitic have a common basis in the existence of one particular set of substances. Of all the tests elaborated, that which goes by the name of the Wassermann reaction has claimed most attention. This is partly due to the fact that it was first in the field, but chiefly because it was, in the first instance, thought to result from a natural development of our knowledge regarding the phenomenon of "complement-deviation" or "complement-absorption," which has engaged the attention of bacteriologists since the work of Gengou [1] in 1902, and of Moreschi [2] in 1905. This phenomenon can easily be understood if the following elementary facts be kept in mind. When the red blood corpuscles of, say, the ox are injected into a rabbit, the blood-serum of the animal acquires, in the course of a few days, the property of destroying *in vitro* ox corpuscles so as to cause the contained hæmoglobin to pass into solution (phenomenon of hæmolysis), that is to say, if the serum of such an animal be placed in a test-tube and some ox corpuscles be added, and the mixture be kept at blood-heat for about an hour and a half, the protoplasm of the corpuscles is dissolved, and, the hæmoglobin being liberated, a clear, blood-stained solution results. This, it has been found, is due to a combined effect on the corpuscles of two substances in the rabbit serum—one, the complement, which is normally present in every rabbit's serum, and which is also represented by an identical or allied body in every mammalian serum hitherto examined—the other, called immune body or amboceptor, which appears in the rabbit's serum as the result of the previous injection of the ox blood corpuscles. The complement possesses the peculiarity of being destroyed by half an hour's exposure to a temperature of 55° C., which treatment has no effect on the immune body. A fluid containing the latter alone can thus be obtained by heating the serum of the injected rabbit. If it is desired to have complement again present in such a fluid, this can be effected by adding some serum from any ordinary rabbit which, as stated above, contains complement but no immune body. A mixture of blood corpuscles, heated immune serum (usually simply referred to as "immune body") and ordinary rabbit serum (usually referred to as "complement") is called a hæmolytic combination, because if it be kept at blood-heat for a time hæmolysis will occur. The properties of complement have been much studied and, amongst other things, a special reaction called complement-deviation has been discovered, by means of which it can be removed from a serum containing it, so that the latter is no longer capable of forming part of a hæmolytic combination. The substances capable of bringing about complement-deviation are *par excellence* obtained as the result of the processes occurring in the animal body when it has to deal with albuminous matters other

than those naturally present in it. Thus, if sheep serum be injected into a guinea-pig the serum of the latter, in the course of a few days, develops the property, when added to sheep serum, of producing a cloudy precipitate (precipitin), and, even if no such grossly palpable reaction occurs, evidence has been obtained with regard to a whole series of albuminous substances that, when these are introduced into the body of an animal to which they are foreign, an antagonistic mechanism comes into play, whose activity is reflected in the appearance of substances in the serum of the animal. The substances stimulating this antagonistic mechanism are usually called antigens, and the substances resulting in the animal's serum are referrred to as antibodies. There is a marked specificity existing between a particular antigen and the antibody to which it gives rise; thus the serum of a guinea-pig treated with sheep serum will not form a precipitin with human serum. Now, if to a mixture of an antigen and its antibody-containing serum any complement be added and the mixture kept at blood-heat for a short time, the result will be the disappearance of the complement; this can be detected by adding the other elements of the hæmolytic combination of which the complement may be a member; its disappearance will be indicated by no hæmolysis occurring. This is the complement-deviation reaction.

Not only is this reaction obtainable with the body fluids of animals experimentally injected with such antigens as foreign sera, but in natural infections the foreign albumen of the infecting bacterium has to be dealt with by the infected animal, and we thus often find that the serum, during a natural illness, when mixed *in vitro* with an emulsion of the bodies of the causal bacterium, is capable of deviating the complement of a hæmolytic combination. This has been shown to occur in typhoid fever, cerebro-spinal fever, gonorrhœa, and by Wassermann and Bruck[3] in tuberculosis. As a consequence of the last-named work, Wassermann, Neisser, and Bruck[4] noted that a similar reaction appeared to occur in syphilis. Here a difficulty occurred in conducting *in vitro* experiments with syphilitic sera, in that the *spirochæte pallida*, which there is strong reason to consider to be the cause of the disease, cannot, as yet, be artificially cultivated. This was got over by using for such *in vitro* observations a watery emulsion of the liver from cases of congenital syphilis in which frequently the organism is found in large numbers. For the Wassermann reaction, therefore, a mixture of the blood-serum of the suspected syphilitic was mixed with such an emulsion and the complement-deviating qualities tested. If complement-deviation occurred, the interpretation was that the spirochæte in growing in the tissues had acted as an antigen and stimulated an antibody formation, and in the *in vitro* test this antibody reacted with the organisms present in the liver emulsion. If

complement-deviation occurred, the presumption, therefore, was that the case was one of syphilis.

Such, historically treated, is the evolution of the Wassermann reaction, and such was the original interpretation of the underlying principles. But facts soon emerged which seemed to be inconsistent with this view. The chief of these lay in the observations of Landsteiner, Müller, and Potzl,[5] and of Marie and Levaditi,[6] that the presence of spirochætes (the theoretical antigen) was unnecessary, and that the reaction could be obtained if an emulsion of a normal liver or of other normal organs were mixed with syphilitic serum. These observations have been fully confirmed, and as a matter of fact it is now usual in the application of the test to employ an emulsion of guinea-pig heart as a practically efficient "antigen." The matter has been still further complicated by the discovery by Levaditi and Yamanouchi[7] that an alcoholic as well as a watery solution either of syphilitic liver or of a normal organ is capable of acting as "antigen." The significance of this observation lies in the fact that the substances taking part in a true complement-deviation have been looked on as of an albuminous nature and therefore as being insoluble in alcohol. There has thus recently been rather a tendency towards the position that while the facts regarding complement-deviation led Wassermann to his discovery, still the reaction associated with his name may in reality have underlying it principles of an entirely different character than those concerned in true complement-deviation. We cannot here take up the various hypothetical explanations of the reaction which have been advanced. Suffice it to say that the solubility of the effective antigen in alcohol has suggested that substances allied to fats (lipoids), and especially the phosphorised fat lecithin, may be concerned in the reaction, the idea being that this substance forms the antigen of normal organs, and that either lecithin itself or some modification due to action upon it of toxins secreted by the spirochæte is the antigen of the syphilitic liver (Citron[8]). It had been supposed that such lipoids when brought into contact with a syphilitic serum find in it substances, combination with which enables them to originate complement-deviation. These substances are either antibodies originated by the true antigen—the spirochæte pallida—or they are products resulting from a destructive action of the spirochætes on bodily cells. Here we may merely say that not only is the substratum of facts underlying such considerations of a meagre description, but as we are entirely ignorant of the true nature of complement-deviation, it is premature to theorise as to the possible explanations of apparently analogous phenomena. We may further state as a not unimportant consideration that a difference may possibly exist between the Wassermann reaction as obtained by using an emulsion of a syphilitic liver and that observed when an emulsion of a normal organ is

employed. It has been shown that the results obtained by using the two methods with the same serum are not always parallel, and in the latest publication from the Wassermann school (Plaut[9]) it is held that, for diagnosis, Wassermann's original method is the most reliable. This view is not, however, universally accepted.

The technique of the original method and its modifications is very complicated, but when properly carried out has yielded results which give good ground for the view that in the reaction a valuable means of diagnosis is available. Citron,[8] in undoubted primary and secondary cases with symptoms, has obtained a positive result in from 90 to 98 per cent. in different groups. Where syphilis is undoubtedly present, but where the symptoms are slight, or, what is important, where the case has been actively treated, the percentage of positive results is much lower, varying apparently from about 50 per cent. in the former to about 30 per cent. in the latter. In ordinary tertiary syphilis the reaction appears again to be most marked when definite symptoms are present. Citron examined 156 sera from non-syphilitic cases, all with a negative result, and M'Kenzie[10] has examined sera taken from persons suffering from other diseases, with a negative result in all except one case where a doubtful reaction was obtained in a person suffering from a lung condition which had been suspected but not proved to be tuberculosis. Wassermann himself records 1010 non-syphilitics, none of which gave the reaction. A few cases have been reported of a positive result occurring in diseases other than syphilis, and a specially interesting group are those where the patients have been suffering from other protozoal infections, such as malaria, sleeping sickness, framboesia tropica, &c.; these protozoal infections evidently merit further inquiry in this connection. A good deal of attention has also been paid to the statement that the serum in scarlet fever frequently gives a positive Wassermann reaction. The evidence here is conflicting (Citron,[8] Plaut[9]), but is as yet insufficient to seriously detract from the opinion now generally held by such authorities as Neisser[11] as to the value of the reaction as a diagnostic agent. Generally speaking, it may be said that a majority of cases of syphilis give a positive reaction, that such a positive reaction is almost certainly indicative of the presence of syphilis, and that it is best to look on a negative reaction as of little diagnostic value.

Most interest has been aroused by the possible help given by the reaction in the diagnosis of the obscurer manifestations of syphilis, especially as it may affect the nervous system. Here a difficulty arises in consequence of the absence of a sharp differentiation between certain cases of what are often referred to as cerebral syphilis (*e.g.* meningitis, endarteritis, gumma), and certain aspects of so-called parasyphilitic affections, the typical examples of which are general paralysis, tabes, and hereditary syphilitic nervous disease. Much work still is required

before the value of the test and the interpretations of the results obtained can be properly appreciated, especially in cases where it is possible that manifestations of both types of the disease may be present. It is already obvious, however, that in all such cases it is absolutely necessary that the properties of both the serum and also of the cerebro-spinal fluid shall in every case be examined, as the reactions obtained with the two fluids sometimes differ; in ordinary syphilis, it may be said, the cerebro-spinal fluid has been found to give a negative reaction. In the examination of cerebral syphilis it has been found that while the blood-serum usually gives a positive Wassermann reaction, the cerebro-spinal fluid usually reacts negatively, *i.e.* the results do not differ from those obtained in cases of syphilis affecting other parts of the body.

The application of the reaction in parasyphilitic disease has recently been dealt with by Mott[12] and by Plaut.[9] Plaut, in 156 cases of general paralysis, obtained a positive reaction with the serum without exception, and an examination of the cerebro-spinal fluid in 147 cases gave a positive reaction in 139 cases; Mott in 46 cases obtained with the lumbar puncture fluid a positive result in 41 cases. According to Plaut, the cases where the cerebro-spinal fluid gives a negative result are those either where the progress of the disease is slow or where there is a tendency to the occurrence of remissions. In the other great parasyphilitic affection—tabes dorsalis—the largest series of observations are those of Schütze,[13] but unfortunately the comparative reactions of the two fluids were not systematically observed by him, and much work here is necessary. In a large number of Schütze's cases a positive result was obtained. From other series the tentative opinion may be expressed that, generally speaking, the tabetic patients react like ordinary syphilitics, *i.e.* the blood reacts but the cerebro-spinal fluid does not; in a much larger proportion of cases than in ordinary syphilis, however, a positive reaction with both fluids obtains. Finally, there has been an investigation of a series of cases of the paralytic and mental conditions of childhood, which of recent years have come to be regarded as often of the result of hereditary syphilis. Here, in a very considerable proportion of cases, a positive Wassermann reaction has been obtained either with the serum or with the cerebro-spinal fluid. It is important to note that in the parasyphilitic conditions mentioned, and especially in dealing with general paralysis, control observations made in non-syphilitic nervous cases have almost uniformly yielded negative results.

Enough has been said to indicate that in the Wassermann reaction we are dealing with a phenomenon which has been very extensively investigated. Its technique has been subjected to rigorous trial, and has been elaborated so as to minimise the risk of experimental error. Those who have worked with the method have been fully alive to the

importance of adequate controls being performed, and, generally speaking, such controls have given a negative result, or when positive results have emerged the circumstances have been such that in practice little danger of confusion would have arisen. As a general result, it appears probable that in syphilis the body fluids undergo special changes of such a nature as to make the recognition of these of diagnostic importance. This statement applies not only to ordinary syphilitic manifestations, but also to conditions which may be looked on as due to secondary effects of the operation of the causal virus. Much work is still necessary before the reliability of the method can be said to be fully established; but even if it were finally rejected, a very definite advance in knowledge of the pathological processes at work in the disease will have been attained.

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* These papers contain general reviews of the subject, and have full references.

THERAPEUTICS.

By FRANCIS D. BOYD, C.M.G., M.D.

Strophanthin.

Most observers are familiar with the variability in the therapeutic results at times obtained in the use of strophanthus in cardiac disease, a variability which is at times so marked as to have led some clinicians to abandon its use altogether. Disappointment has been attributed to variations in the activity of the different preparations. Recently, however, Hatcher has shown that strophanthus, when injected into the

circulation, produces effects of a most uniform character; so uniform, indeed, that he considers the physiological action when so injected less modified by extraneous circumstances than the action of any other substance with which he is familiar. Though much work has been done on the pharmacological action of strophanthus upon the circulatory system, very little is known of its absorption, its excretion, and the extent to which it is destroyed in the animal body. Hatcher's work seems to show why clinicians have been disappointed at times with the results obtained by the oral administration of strophanthus. Absorption of strophanthus from the alimentary canal is very rapid when six times the amount of a lethal dose by a vein is given to an animal. The rapidity of absorption seems to be governed more by the size of the dosage than by the total surface of the intestine concerned in absorption, and rapidity of absorption is a very variable factor. Strophanthus is destroyed to a limited extent in the alimentary canal, but this can scarcely be considered as sufficient to account for the failure of action when small doses are given. The excretion of strophanthus is principally by the alimentary canal, to a less degree by the kidney. When small doses are given by the mouth, absorption and excretion keep pace, and there is thus never enough strophanthin present in the circulation to powerfully influence the heart. Hatcher concludes that the oral administration of strophanthus in therapeutics is irrational in the present state of our knowledge concerning its absorption and excretion in the alimentary canal and destruction within the animal organism.

Are we to use strophanthin, administering it by hypodermic injection or intravenously? Since the intravenous method was first introduced by Fränkel as a therapeutic measure in 1906, it has been used fairly freely, and a number of papers have been published giving experiences.

It is essential for the safe and satisfactory use of such a powerful drug by intravenous injection that we should have chemical purity and exactitude of dosage. Heffter has examined a number of strophanthins which are at present on the market. He finds great difficulty in accepting the present chemistry of strophanthus. Strophanthin should be the glucoside obtained from the dry ripe seeds of strophanthus kombé, freed from the awns, but the commercial seed usually contains the seeds of other species in addition to those of strophanthus kombé. The commercial strophanthins in the *amorphous* form show considerable differences both in their chemical and pharmacological properties, which would seem to indicate that their intravenous use must be conducted with the greatest care. Heffter found from pharmacological observations on animals that Merks's strophanthin was one and a half times stronger than that of Boehringer or of Schuchart. Obviously, therefore, an intravenous dose of one might be safe while the same dose of the other might produce dangerous toxic symptoms. The author considers that it is fortunate that, so far, there have been so few fatal results

—eight have been collected by Liebermeister. Bochringer strophanthin, which has been widely employed, consists of a mixture of two glucosides, which give a different colour reaction when treated with sulphuric acid. The strophanthin of S. kombé and S. hispidus give a powerful green reaction, while the S. Arnoldianus gives a pink reaction, and is not regarded as poisonous by the African natives. A mixture of these glucosides Heffter does not regard as applicable for intravenous injection.

Liebermeister regards strophanthin as a cardiac remedy of extraordinary effective action, though there are cases when it seems to fail. When the heart does not respond, he considers it inadvisable to force the dosage. When the heart responds to intravenous injections of strophanthin in a dosage of 0·5–1 milligramme, the action appears in from one minute to half an hour, showing itself by the increased amplitude and diminished frequency of the pulse. In many instances it is claimed that one injection without any other cardiac remedy is all that is required for the re-establishment of compensation in uncompensated cardiac disease. The action of the injection usually continues for several days. A second injection produces a prompter and more enduring effect.

Pennesi reports ten cases treated by intravenous injections. The results he praises in the highest degree in cases of want of compensation with relatively healthy myocardium. He finds the injections more efficacious than the oral administration of any of the other members of the group of cardiac tonics. No result, however, was got where the oral administration of digitalis had failed, and if the first injection failed to give beneficial action, it was found of little use to repeat it. As a rule the action was rapid, but in some instances it only appeared after one or two days. Lust finds that every severe heart insufficiency which has not yielded to digitalis can be favourably influenced through strophanthin injections in a few minutes. Sometimes a second injection is necessary in 24 hours. In severe cases, when there is myocardial breakdown, small doses should be given at first. To avoid cumulative action the drug should not be given more frequently than once in 24 hours. There are a number of other papers on the subject.

The view is somewhat different when looked at from the side of French literature. M. Catillon, discussing strophanthin, admits the existence of only two forms of therapeutic value, one obtained from S. kombé and one from S. glaber and S. gratus, the latter identified by Arnaud as ouabaine. There are many commercial amorphous strophanthins obtainable in Germany which one might describe as secret remedies. Those used in France are pure crystallised products. Mayer concludes that the intravenous injection of a cardio-tonic medicament is a dangerous method of treatment, and the general opinion of

speakers at the Medical Society of Geneva was in accordance with this view. Mayer points out that patients suffering from chronic nephritis, serious changes in the coronary arteries, or grave deterioration of the myocardium, are particularly bad subjects for the intravenous injection of cardio-tonic drugs. He finds that if the first injection has not sensibly modified the clinical conditions it is dangerous to repeat it.

The writer's experience of the intravenous injection of amorphous strophanthin, though too limited to be of much value, has not been entirely satisfactory. Immediate beneficial results have not been a marked feature, and in one case the injection was followed by a severe, though transient, phlebitis, necessitating the hypodermic use of morphine to alleviate the pain.

One may conclude from a study of the literature that the intravenous administration of strophanthin is a procedure which, in the present state of our knowledge of strophanthin, should be reserved for grave emergencies, and that while the technique is simple, there are disadvantages and dangers attending its administration which would lead one rather to adopt the intra-muscular method of administration when immediate action was not essential.

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NEW BOOKS AND NEW EDITIONS.

Common Disorders and Diseases of Childhood. By George Frederic Still, M.A., M.D., F.R.C.P. London: Henry Frowde, Oxford University Press; Hodder & Stoughton. 1909.

The author of this, the latest contribution to pediatric literature, cannot be too highly complimented on the result of his labours. The framework of the volume is built up of lectures delivered at King's College Hospital, and at Great Ormond Street Hospital for Sick Children, and to these have been added many chapters on miscellaneous subjects, culled from the repositories of the writer's large and matured clinical experience.

The author lays no claim to have written a text-book on the diseases of children, and it is this very freedom, from the hide-bound necessity of alluding to every ailment of childhood, that has permitted him to produce an original volume which will be read with interest and profit by every pediatric physician.

While the majority of the commoner forms of disease in children are described, the author often roams far from the beaten track, and, giving free play to his fancy, devotes long chapters to the significance of certain groups of symptoms in many and diverse conditions, greatly to the benefit of the reader. It is to this freedom of action that we owe such chapters as the Causation of Abdominal Pain in Children, the Medical Aspects of Dental Caries, Fever of Obscure Origin, Nervous Children, Nystagmus in Infancy, and many other chapters devoted to the elucidation of questions that are frequently puzzling and perplexing, and from which we get no help from the ordinary text-book.

The earlier portion of the book is devoted to the growth and development of the infant and to the consideration of infant feeding, and includes an admirable chapter on the Use and Abuse of Condensed Milk, which is full of common sense. The writer condemns with no uncertain voice the administration of raw milk, not only during infancy, but throughout the whole period of childhood, and states that in his experience 29 per cent. of cases of tuberculosis were due to alimentary infection. The chapters on Abdominal Tuberculosis leave nothing to be desired, and we cordially agree with the opinion expressed, that laparotomy is rarely, if ever, advisable in the plastic form of tuberculous peritonitis, except for the relief of special symptoms. Exception might be taken to the inclusion of congenital hypertrophy of the pylorus amongst the common diseases of childhood, to the assertion that the majority of cases of this condition recover if recognised early, as also to the author's views regarding the extreme frequency of brain affections in congenital syphilis, and to the statement that cretinism is rarely recognisable before the sixth or seventh month. There are other opinions expressed in the book, regarding which, did the space at our disposal permit, we would like to cross swords with the author, but that in no way detracts from our admiration for the clear, original and attractive manner in which the work is written, and for which we have nothing but the highest praise.

The Diseases of Infancy and Childhood. By L. Emmett Holt, M.D., Sc.D., LL.D. Fifth Edition, revised and enlarged. Pp. 1171. New York and London: D. Appleton & Co. 1909. Price 25s.

Fresh editions of Dr. Holt's book follow each other in rapid succession. The present one, the fifth, is not materially different from the last.

It therefore requires only a brief commendation. In the chapter on tuberculosis there are some valuable pages on the various local tuberculin tests. The author's own personal investigations with those tests lend special weight to his discussion of their comparative value as diagnostics in tuberculosis. New matter has also been introduced into the article on cerebro-spinal meningitis by a careful account of the treatment with Flexner's serum. The sections on tuberculous meningitis and acute poliomyelitis have been thoroughly revised. Apart from these alterations, this admirable and comprehensive text-book of the diseases of children remains practically unchanged. It has already won its high place in the literature of the subject, and no more need be said.

The General Characters of the Proteins. By S. B. Schryver, Ph.D., D.Sc. Pp. 86. London: Longmans, Green & Co. 1909. Price 2s. 6d.

The Vegetable Proteins. By Thomas B. Osborne, Ph.D. Pp. 125. London: Longmans, Green & Co. 1909. Price 3s. 6d.

These two volumes belong to the valuable series of *Monographs on Biochemistry*, edited by Aders Plimmer and Hopkins, of which the first three volumes were reviewed here some time ago.

In the monograph on the general characters of proteins Dr. Schryver takes up first the physical properties of proteins, such as their solubility in salt solutions and other solvents, their coagulation and precipitation, the crystallisation of proteins, their molecular weight and electrical conductivity, and the fractional filtration through gelatine membranes. In the second part the chemical characters are dealt with, especially with reference to the isolation and identification of proteins, and some of the methods devised for that purpose are described in detail. The chapters on the Nitrogen Content and Distribution, on the Behaviour of Proteins towards Acids and Bases, on the Action of Halogens on Proteins may be specially mentioned as containing much useful information.

In a third part the precipitin test is treated of in six pages. This is the weakest part of the book. It would have been interesting to have this subject discussed critically from a chemical point of view. But the author does not seem to be very familiar with this subject, and is content to give a very elementary and not very accurate account, such as may be found in a student's text-book. The author speaks of the precipitin test as a means of identifying different proteins. That is a serious error. It is not possible to identify by means of this test the different proteins of the various tissues and body-fluids of one species of animal. The test indicates nothing but the zoological source of a given protein.

The bibliography appended to this volume is not sufficiently complete. We have missed references to a paper by Zuntz on the gold number, to papers by Pfeffer and Tamman on the subject of molecular weight determination, to a paper by Pauly in the section on the electrical conductivity of protein solutions.

Our knowledge of the chemistry of the vegetable proteins has been advanced mainly through the work of the distinguished American chemist, who is the author of the monograph on *Vegetable Proteins*. Based mainly on Dr. Osborne's own work, this monograph represents an authentic summary of our present knowledge of this subject, and must be regarded as one of the most important contributions to recent biochemical literature. Besides containing a complete account of the literature, it has the advantage of being readable.

After dealing with the occurrence of proteins in the different parts of plants, and with the methods of extraction, the author goes on to describe the physical and chemical characters of the vegetable proteins.

The chapter on the Products of Hydrolysis treats more especially of the various forms in which the nitrogen and sulphur is bound up in the protein molecule, while with regard to information on the amino-acid units present in the vegetable proteins, the reader is referred to a former monograph of this series (by Plimmer). In a subsequent chapter the vegetable proteins are classified according to our present knowledge of their chemical constitution. The final chapter deals with the toxalbumins, ricin, abrin, and crotin, which Dr. Osborne believes to be of the nature of true proteins.

This monograph begins with the modest remark that our present knowledge of the vegetable proteins "has not yet advanced beyond what is, in fact, a mere beginning of a serious study;" it ends with a bibliography of 600 papers.

Materia Medica, Pharmacy, Pharmacology, and Therapeutics. By W. Hale White, M.D. Eleventh Edition. Pp. 695. London: J. & A. Churchill. 1909. Price 6s. 6d.

That this book has reached an eleventh edition is ample proof of its popularity. Although only two years have elapsed since the last edition, the present volume has been revised and brought thoroughly up to date.

Some slight additions have been made, but the volume still retains its pocket size, and can be thoroughly recommended as a handy and reliable guide, both as a text-book for the use of students preparing for examinations and as a reference book for the practitioner.

Introduction to Practical Chemistry, for Medical, Dental and General Students. By A. M. KELLAS, B.Sc.(Lond.), Ph.D.(Heidelberg). Pp. 251. London: Henry Frowde and Hodder & Stoughton, Oxford University Press. Price 3s. 6d.

THIS work has been specially adapted by the author to meet the requirements of the Conjoint Boards' Examination of the Royal Colleges of Physicians and Surgeons, and a perusal of the volume reveals that this has been admirably accomplished. The author has had seventeen years' experience in teaching practical chemistry to medical students, and he has found that but rarely is the theory of chemistry brought into relation with practical chemistry. Mr. Kellas is of opinion that chemical analysis, if carried out intelligently and coupled with the writing of equations which express the positive reactions, is of considerable educational value.

The work certainly differs from most of those devoted to practical chemistry in that it contains very complete explanations of the reactions, and we have little doubt but that a far clearer insight into chemistry will be obtained by the student if he uses such a volume as the present when studying practical chemistry. The work forms another welcome addition to the well-known series of Oxford medical publications.

A System of Operative Surgery. By Various Authors. Edited by F. F. BURGHARD, Surgeon to King's College Hospital. In Four Volumes. Vol. II. London: Henry Frowde, Hodder & Stoughton. 1909.

IN our review of the volumes of this work which have been already published, the standard was described as a very high one. The present volume warrants us in being still more eulogistic, and in describing this system of operative surgery as the best that has ever been published.

Mr. Stiles contributes the first section, dealing with operations for tuberculous diseases of bones and joints. He writes with the assurance and knowledge gained in a long experience at the Royal Hospital for Sick Children, and his opinions on many subjects which are still under controversy, based as they are upon the ultimate results of the cases under his care, which have been followed up for many years either by himself or his assistants, must receive the most careful consideration, especially by those who differ from him. It need hardly be said that Mr. Stiles follows in the main the teachings of Kocher, but it will be readily seen that he has revised, extended, and altered the methods of Kocher, with an accuracy of knowledge, both of the anatomy of the parts concerned and of the disease which is the indica-

tion for the operation, which render his article one of the most valuable original contributions which has ever been made to this difficult subject. Praise should also be given to the illustrations of the operative procedures, and to the large number of excellent radiograms furnished by Dr. Edmund Price.

Mr. Edmund Owen writes in his usual attractive way on the operations for harelip and cleft palate, while Mr. Cheatle is responsible for the article dealing with the lips, face, and jaws.

It is a matter for congratulation that Mr. Butlin was able to undertake the operations upon the tongue and throat, especially those dealing with cancer, for here the views of a surgeon of great experience, who could tell of his ultimate results, are what the reader especially looks for in a reference work on operative surgery.

Mr. Fagge writes clearly on the surgery of the œsophagus. The operations on the stomach are written by Mr. Moynihan, whose previous contributions in this subject are so well known, that the very high standard of this, his latest article, will be taken for granted; its conciseness is an additional virtue. The operations on the intestines by Mr. Makins is necessarily longer, and presents an admirable view of the subject.

Mr. Barker is responsible for the rather threadbare subject of the radical cure of hernia, and succeeds in imparting to it an interest which reflects on him most creditably.

The operations on the rectum and anus are by Mr. Edward Swanford; the article is very well done, but the abdominal methods for the removal of cancer of the rectum are not up to the level of the rest.

The most cursory glance at the volume would indicate how much care has been bestowed on the illustrations and furnishing, and for the results of their efforts in these directions the publishers are to be warmly congratulated.

Appendicitis and other Diseases of the Vermiform Appendix. By HOWARD A. KELLY, M.D. Pp. 502. Philadelphia and London: J. B. Lippincott Company. 1909. Price 25s. nett.

THE work before us is really an abridgment of the monograph on *The Vermiform Appendix and its Diseases*, which Dr. Howard Kelly published in conjunction with Dr. E. Hurdon in 1905. It has been issued with the object of presenting the practical side of the subject in such a way as to "meet the daily needs of the great army of general surgeons throughout the country." When we reviewed the larger work (*Edinburgh Medical Journal*, 1905, Vol. II. p. 452) we expressed our unqualified admiration of both its substance and its form, and we can only reiterate what we then said. At the risk of appearing captious we

would suggest that, to the reader of English, the use of italics for purposes of emphasis is more pleasant than the widely spaced lettering of the German printer. A very complete index renders the text easy of reference.

A Manual of Operative Surgery. By Sir FREDERICK TREVES and JONATHAN HUTCHINSON. Third Edition, in 2 volumes. Vol. I. pp. 775. London: Cassell & Company, Ltd. 1909.

FOR the revision of this manual Mr. Hutchinson is responsible, and he has found it necessary to recast the subject-matter throughout, deleting much that has become obsolete, and adding new chapters to bring the work abreast of recent advances. The general principles of operative surgery are dealt with in six short chapters. The first concerns "the patient," and the various factors that must be taken into consideration before an operation is performed are fully detailed. In the second, "the operator" is discussed in a series of platitudes which add little to the value of the work. The attempted joke in the last paragraph could well have been spared, even if it had been grammatically expressed. Chapter III. embodies a description of the operating theatres of the London Hospital, and is embellished with a series of photographs of furniture suggestive of an instrument maker's catalogue. A short section on "operations in a private house" contains some useful advice, but while we are prepared to agree that "it is essential that the house be in a perfectly sanitary condition," we feel that it is scarcely practicable that "the building should be examined by a skilled person" before an operation is undertaken in it. The beginner will find the three following chapters on Instruments and Accessories, Elements of Operative Surgery, and After-treatment full of instruction.

The rest of the volume is occupied with a description of "abdominal operations," including those on the genito-urinary organs, and a useful section on gynecological operations. The procedures described in detail have been judiciously selected, and the author, wisely, we think, has avoided burdening his text with too many minor modifications suggested by individual surgeons. A number of excellent coloured anatomical plates have been introduced and many new illustrations have been added. Many remain, however, which are scarcely up to the standard of a work of this importance.

Sprains and Allied Injuries of Joints. By R. H. ANGLIN WHITELOCKE, M.D., M.C.(Edin.), F.R.C.S.(Eng.). Pp. 241. London: Henry Frowde, Hodder & Stoughton. 1909. Price 7s. 6d.

THE writer has had a unique experience of joint injuries among the undergraduate athletes at Oxford. The many interesting cases, culled from accidents at football, cricket, rowing, and other sports, make the

book an eminently readable one, but the author has a deeper purpose to serve. He lays the blame at the door of the doctor for many avoidable cases of incapacity for work, and for the popularity of the bone-setter. Now that an exact diagnosis has been rendered possible in nearly every case of joint injury by radioscopic examination, it behoves the medical man to take more trouble with the so-called "little things" of surgery. No stereotyped method of treatment of joint injuries exists, and the rational procedure can only be determined in each case when the lesion has been exactly diagnosed.

The chapter on Sprains, considered generally, sets clearly before the reader the advantages of voluntary movements in securing good functional results. For eighteen years the author himself has not found it necessary to use a splint for sprain. To check effusions, and to hasten their absorption, he advocates the use of intermittent elastic pressure. The pressure is secured by a firm bandage over a thick pad of wool, and its removal once or twice a day leads to a flushing of the tissues, and a dispersal of vitiated products. The sequelæ of sprains are classified as avoidable and unavoidable, and the former are the more numerous—another indication that changes in treatment are necessary. One chapter is devoted to individual articular derangements, another to sprains in the region of the knee-joint, and a third to internal derangements of the knee. A particularly clear exposition is given of injuries to the semilunar cartilages. Palliative treatment of a loose cartilage by special apparatus, and suture of it to the tibia, are condemned. The only satisfactory treatment is removal of the loose fragment. It is noteworthy that, even after arthrotomy, the leg is not fixed on a splint. The remainder of the book is taken up with injuries to muscles and tendons, and a general consideration of massage, movement and exercises in the treatment of sprains and bruises.

The illustrations are on the whole excellent, but the X-ray pictures vary in clearness. Their reproduction on the reverse side of a printed page is sometimes not a success. The index appears to be complete.

The Treatment of Fractures, with Notes upon a few Common Dislocations. By Charles Locke Scudder, M.D. Sixth Edition. Thoroughly Revised and Enlarged. Pp. 628. 856 Illustrations. Philadelphia and London: W. B. Saunders Company.

In the new edition this book maintains its former good qualities. It presents to the reader in a concise form a good selection of the methods adopted in the treatment of various fractures. The excellent combination of brief description and profuse illustration renders each method easy of understanding. In the present edition the operative treatment of fractures receives fuller attention, and the difficulties of

ununited fractures are carefully considered. Certain individual fractures are treated at special length—obstetrical fractures of the skull of the new-born infant, fractures of the malar bone and superior maxilla, the head and neck of the radius, the scaphoid of the wrist, and the neck of the femur. The chapter on the Röntgen Ray and its Relation to Fractures is of value in pointing out mistakes in interpretation which have arisen. The illustrations are numerous and well chosen, and they reach a high standard of excellence. A useful feature of the book is a bibliography of the recent memoirs on fractures.

NOTES ON BOOKS.

NISBET'S *Medical Directory*, which has appeared for the second time, is an attempt to provide the profession with a professional directory of a more convenient size than that issued by Messrs. Churchill. A severe restraint has been put on those whose notions of the importance of the appointments they hold and the works they have published are the chief reason for the size of the older directory.

It has thus been possible to compile a medical list which, so far as our tests went, is perfectly accurate, in a comparatively small and handy volume, at a cost of 7s. 6d.

Part II., the local directory giving the lists of practitioners in the different towns, is wonderfully clear.

The "classified list of publications" should have added to it the words "advertised in this directory," for the list is restricted to the productions of six firms.

The Edinburgh Students' Handbook is now in its fourteenth year, and there are very few things which a student in search of information will fail to find in its pages. Indeed, graduates of considerable standing will find a lot to interest them in turning over its pages.

Another students' book is *A Handbook on Foreign Study*, published for the "International Academic Committee," and edited by Mr. Darnton Fraser. Graduates who propose to spend some time in study abroad will find in it, not of course all they want to know, but enough to provide them with the means of getting it.

In the case of some of the schools, we are able to check the information given, and assuming, as we surely may, that all are equally accurate, we cordially congratulate the editor on the useful handbook he has produced.

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